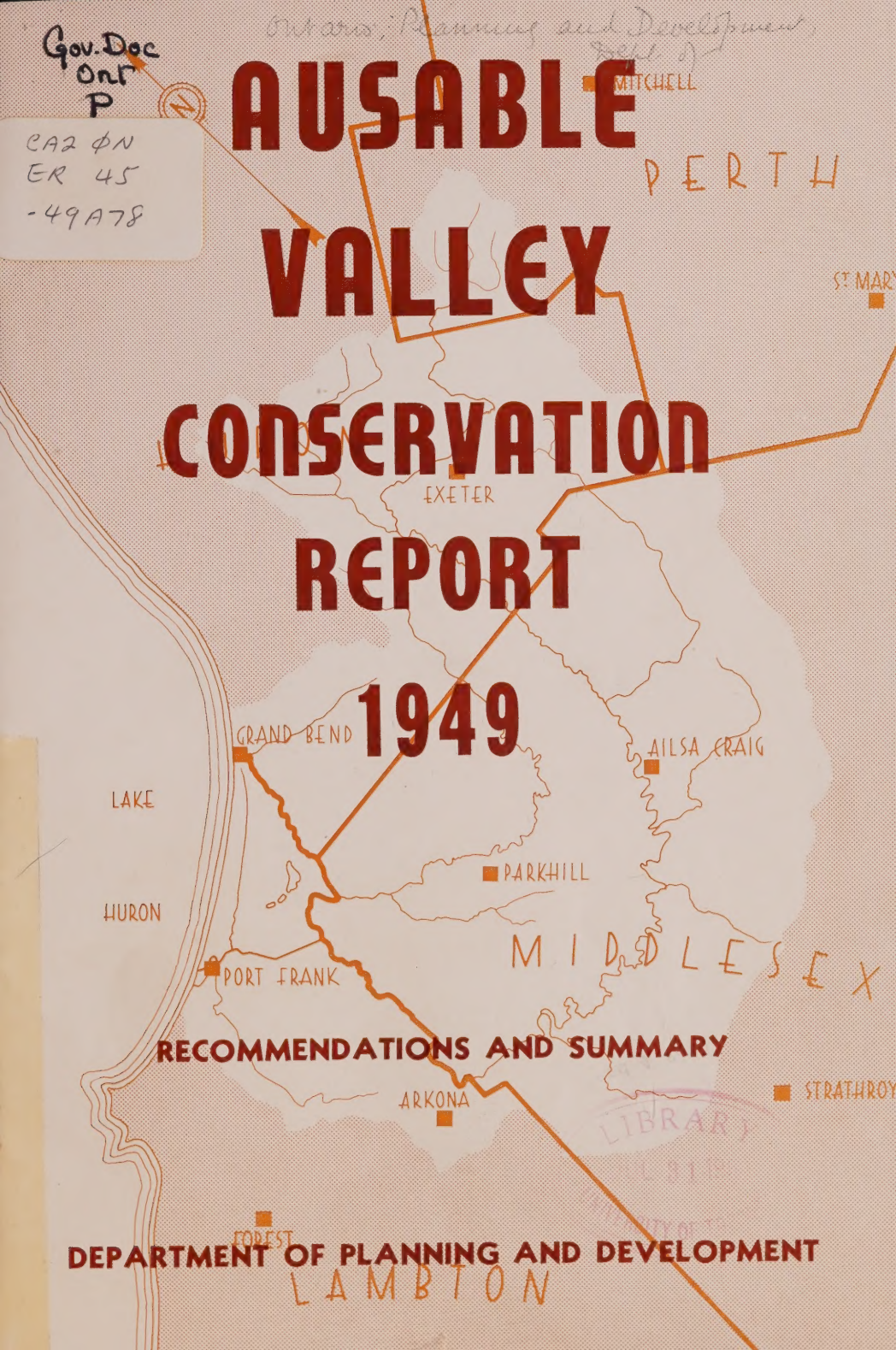
AUSABLE VALLEY CONSERVATION REPORT 1949



RECOMMENDATIONS AND SUMMARY

DEPARTMENT OF PLANNING AND DEVELOPMENT

FOREWORD

This Summary of the Ausable Valley Conservation Report is composed of six sections, namely: General (Location and Boundaries, Geology, Physiography and Land Settlement), Soils and Land Use, Forestry, Water, Wildlife and Recreation.

The following large maps are included in the full Report and a limited number are available on request:

Source Areas—Reforestation Land and Existing Woodland
Map in two sections, each 21 x 36 inches, scale one mile to one inch. Three colours.

Soils
Map 23 x 25 inches, scale one mile to $\frac{5}{8}$ inch. Twelve colours.

Present Land Use
Map 23 x 25 inches, scale one mile to $\frac{5}{8}$ inch. Black and white.

Recommended Land Use
Map 23 x 25 inches, scale one mile to $\frac{5}{8}$ inch. Nine colours.

Ausable River Conservation Authority

Established July 30, 1946

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Vice-Chairman.....FREEMAN HODGINS, R.R. 8, Parkhill, Ont.

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Williams East Township.....J. A. MORRISON*

Williams West Township.....JOHN E. McPHEE

*Member of Executive Committee

(*OVER THE PAGE*)

The Old Ausable in the Pinery. This beautiful stream with its clear water and unusual flora is a favorite haunt of naturalists.

Department of Planning and Development

HON. WILLIAM GRIESINGER, Minister

A. H. RICHARDSON
Chief Conservation Engineer

Ausable Valley Conservation Report

1949

RECOMMENDATIONS
and
SUMMARY

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PART I—GENERAL

1. LOCATION AND BOUNDARIES

The watershed of the Ausable River is an area of 665 square miles lying close to the eastern shore of Lake Huron, in the area between the cities of London, Sarnia, Goderich and Stratford. It is bounded on the north by the watershed of the Bayfield River, on the east by that of the Thames, while on the south it borders on the drainage area of the South Sydenham River. To the west, the boundary follows that of the watersheds of various smaller streams and watercourses draining into Lake Huron, except for the section between the mouth of the river and Grand Bend. Here the boundary for several miles follows a range of sand hills along the lake shore, close to the beach.

The term "watershed" is commonly used to describe the area which is drained by a river and its tributaries. It is in this sense that the term is used in this report, and throughout the report the terms watershed, drainage area, drainage basin and drainage unit are used interchangeably.

The main stream of the Ausable River rises in the neighbourhood of Staffa and flows, with many changes of course, south-west to Exeter. Here it turns and flows south for about twelve miles, when it begins a sweep to the west for some seven miles. With many more changes of course it finds its way to the lake through the sand hills near Port Franks.

The drainage area of the Ausable lies chiefly in the County of Middlesex, but also includes a large area of Huron County and smaller parts of Lambton County on the south-west and Perth County on the north-west. Parkhill in Williams West Township is the only incorporated town within the watershed, but Exeter in Huron County, an incorporated village, is the largest centre in the area. The other incorporated villages are Lucan, Hensall, Thedford, Ailsa Craig and Arkona. The summer resort of Grand Bend is more widely known than any of these places and during the season has a much larger population than any other centre in the area.

2. GEOLOGY

1. INTRODUCTION

The bedrock geology of the watershed is significant for three main reasons. The first is the commercial importance of limestone, shale, oil and natural gas found in the rocks. The second is the influence of the bedrock on the nature of the soils of the region and the third is indirect effect of the rock structure on the surface relief.

2. THE BUILD

Ontario, west of the Niagara escarpment and the Collingwood hills, is underlain by a rock plain which dips towards the south-west. The highest portion of the rock is in the vicinity of Collingwood where it approaches 1700 feet above sea level. From that point the surface dips at the rate of about 20 feet per mile towards Kettle Point. The surface of the rock throughout the area is very

nearly level, having been worn down and very little disturbed throughout the geologic ages since its deposition.

3. PHYSIOGRAPHY

1. SURFACE RELIEF

The relief of the watershed is marked by two main features, a flat expanse near Lake Huron with elevations from six to eight hundred feet and an upland region with elevations from eight to eleven hundred feet above sea level. The flat country consists of post-glacial deposits of sand, silt and clay or of glacial deposits smoothed and veneered with clay by water action. The upland region rises from west to east but is marked by a north-south ridging, of morainic character, which causes stream flow to conform to it rather than in the westerly direction in which the average slope tends. The river cuts through the most prominent of the north-south range of hills near Arkona. Dissection of the hills by the main stream and some of its tributaries gives the boldest relief on the watershed.

2. GLACIATION AND LAND FORMS

Material deposited under the ice as it moved is called ground moraine. In this region it was spread out to form generally smooth topography and constituted a "till plain". Halts in the movement of ice fronts are marked by elevated ridges with rougher surfaces called end moraines.

When glaciers melted the water ran away through channels cutting quite large valleys. These are broad with steep sides and have flat, terraced floors called "spillways". In the large post-glacial lakes clay, silt and sand were deposited to form "clay, silt and sand plains". At the margins of the lakes gravel "beaches" were formed. These lie inland from the present Lake Huron.

There are deposits of silt lying over the heavier material on the moraines and till plains of the uplands. This silt is believed to have been deposited by the action of wind. Some of the depressions in the rougher topography, old lake beds and floors of spillways, have an accumulation of decayed organic matter over the mineral material. The less decomposed deposits are called "peat" and the more decomposed are called "muck".

All the glacial and recent land forms mentioned above are found on the watershed. Their extent and distribution are shown in the physiographic map accompanying the full report.

4. LAND SETTLEMENT

Since the Ausable lay off the trade routes used during the French period, it was little explored until well into the nineteenth century. A few missionaries and traders visited the region, which was the territory of the Neutral Indians until they were destroyed by the Iroquois in 1650. Jean de Breboeuf probably reached the Ausable and the Jesuits may have had a mission near it for a time, but this was wiped out in the general destruction.

Fossil bearing beds are exposed in the gorge near Arkona.

View of a moraine. Note the steep slopes and the hummocky topography.

Imperfectly drained clay soil on the old lake plain. This kind of land lends itself to large scale mechanized farm operations as seen here.

Later the Chippewas took over this part of the country and an important trail from Flint Point crossed the watershed. Little was known about the river, however, until Lieutenant Willson made a survey of part of it in 1819. At that time a portage was used in Spring by the Indians from the Ausable near Nairn to the Thames at Delaware.

The settlement of the southern part of the watershed began about the same time, with the survey of the northern parts of London and Lobo Townships in 1819 and 1820. A number of families settled within the watershed in these townships before 1830.

In 1826 the Government decided to change the method of granting land to settlers. Instead of a free grant subject to certain fees, the settler was now to buy his land outright at a low price. To get a quicker return from land sales and to avoid some of the pressure on Government departments, the practice was revived of selling large areas of land to individuals or companies, who undertook to bring in settlers to whom they resold the land in farm lots. Most of the Ausable Watershed was settled under the new system and by far the greater part of it was purchased by the greatest and best known of the Land Companies, the Canada Company.

This Company was formed in Britain for the purpose of buying the greater part of the Crown Reserves and almost the whole of the Clergy reserves in Upper Canada. The Company was to provide roads, churches, schools and mills and to resell the land to settlers making what profit they could. The Clergy Corporation would not accept the price offered for the Clergy Reserves (nearly one seventh of the townships surveyed before 1826) and in the end the Canada Company was allowed to purchase some 1,000,000 acres of the unsurveyed wild lands instead.

This immense "Huron Tract" included all the Ausable Watershed except parts of London, Lobo, Adelaide and Warwick Townships. Most of the remaining Townships were named for the officers of the Company, as were some of the villages in the area also.

The Company paid for this great area a price which was not very much lower than the current price of wild land in undeveloped sections. They sold the land at first by a system of instalment payment. On the whole the system worked well, though the Company was disliked by many groups and was harshly criticised. They retained a monopoly of mill sites, renting them to individuals and the settlers complained that they were slow in building roads and mills and, when the system of payment by instalments was altered to one of leasing combined with instalment purchase, they charged the Company with drawing an excessive rate of interest and making great profits from the increase of land values. This last charge was true, but this was, after all, the purpose for which the Company was formed.

The Canada Company was primarily a commercial concern and as such was actuated chiefly by considerations of profit. When "good business" (usually on a short-term basis) could be combined with wise planning for the future of the district, the Company planned as wisely as could be expected. But when the interests of the shareholders clashed with those of the settlers, the shareholders

MUNICIPALITIES

SCALE: MILES

1 0 1 2 3 4 5

were apt to get the best of it. Company officers did not, as their more vocal opponents seemed to think, spend their nights plotting the further oppression of the inhabitants; but on the other hand, they may properly be charged with short-sightedness, some bad management and, in a very few instances, incompetence.

In spite of the criticisms, it would appear that the Huron Tract was settled quickly and developed at least as rapidly as areas settled by other methods. The Company at once opened two main roads. The Wilmot Road passed to the north of the watershed, but the London-Goderich Road crossed the eastern part of the area. Other roads were soon opened connecting with this main road. There was extravagance and waste in the building of these roads (due chiefly to inexperience on the part of Company officials) and they were, like most roads in Upper Canada, abominably bad in the thirties and forties. Improvement however, began as early in this part of the province as elsewhere. From 1855 on the roads were, on the whole, reasonably good.

Churches were few in the watershed in the early days and schools were not very numerous. Until about 1850 there appear to have been only two resident clergymen (at Adelaide and in Williams East) and the other churches were served from outside the watershed. There were a few schools before the Act of 1841 and there seem to have been about ten or twelve "common" schools in the area when the present Public School System was founded by the Act of 1846. School houses were frequently used for religious services.

After the change in the Company's land sales policy, there was an influx of settlers into the area and the pace of development was accelerated. Much of the watershed had been settled by 1854. Village development began, but did not make much headway until after 1850, for there was no trade with the outside world since the new settlers consumed the surplus of farm produce and even of lumber. With the good times of the fifties the situation changed. There was a great increase in land values and another rush of settlers into the area. There was now an exportable surplus and farmers and lumbermen were prospering. Living conditions gradually changed. The hardships of backwoods life were lightened and the area was becoming more civilized though hardly more peaceful.

The various townships were organized in the thirties and forties and the counties somewhat later. The "Western" and "Huron" Districts were set up in 1842. The counties of the Western District became the United Counties of Essex, Kent and Lambton in 1853. Perth County was separated from the Huron District in the same year but Huron and Bruce remained united until 1866. Biddulph and McGillivray Townships were separated from Huron County in 1863 and annexed to Middlesex County.

The boom times of the fifties brought about the rise of a number of thriving villages, chiefly located near the few areas in the watershed where mills could be operated to advantage. Exeter, Nairn, Clandeboye (then called Ireland), Widder, Carlisle and Arkona were all flourishing by 1857. However, when the Grand Trunk Railway was built in 1859, the villages near, but not directly on, the line of the railway declined slowly, while new centres such as Lucan, Parkhill,

Carlisle from the south, 1947. Remains of Shipley's mill in the right foreground. Victoria Hotel to left and church in the distance on extreme right.

St. Anne's Church, Adelaide. Built in 1866, the first church in the Ausable Watershed.

The "back street" at Nairn, 1947.

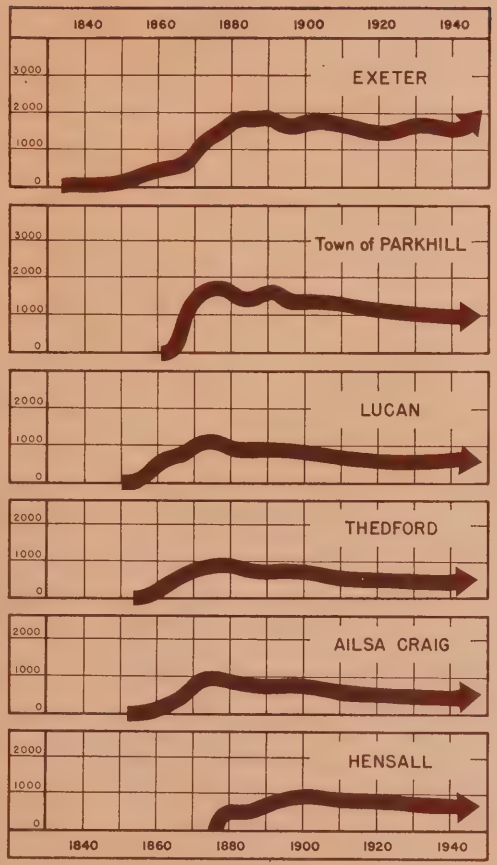
Ailsa Craig and Thedford grew up at stations on the line. These villages and those on the London Road flourished during the sixties and early seventies. When the Huron, Grey and Bruce Railway was finished in 1877, Exeter had an increase of importance and new villages (Centralia and Hensall) grew up on the new line at the expense of the older "post" villages along the London Road. After 1880 all the villages experienced a set-back and several declined rapidly in population. Most of the older "pre-railway" villages have almost disappeared. Exeter is now the only large village in the area which is still growing, though some others have maintained their ground since the beginning of this century and are now making some gains.

Port Franks and Grand Bend had an exceptional history. Port Franks was laid out by the Canada Company as a lake port for the area. The site first chosen was at Grand Bend, but later the actual village was laid out in the sand hills near the mouth of the Ausable. Port Franks was a small lumbering and fishing village through the fifties and sixties. However after the opening of the "Cut" it had a period of prosperity as a port, though it was never a large place. The silting up of the river destroyed its value for shipping and it is now the centre of a resort area. Grand Bend began as a mill village and became a fishing port after the New Cut was made. About the same time it began to be a popular resort but grew enormously with the coming of the motor car. It is now by far the most populous centre on the watershed during the season, but declines into a rather small place in the winter.

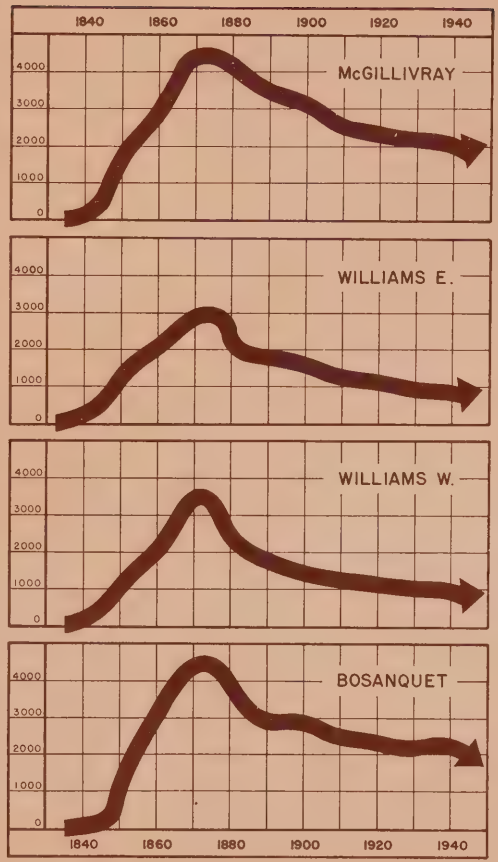
The rural parts of the area continued to flourish during the seventies and, with some set-backs, during the 1880's and part of the 1890's as well. There was a change in rural economy about 1880, however, brought about by the decline in the demand for Ontario wheat. The farmers had been gradually turning to other sources of revenue for some time. Machinery was coming into more general use and the farm population was already declining. There had been a rage for cheese making and flax growing during the late sixties. The peak of this had passed by the seventies and the farmers were mostly engaged in mixed farming with the emphasis on raising cattle, sheep and hogs.

There was another severe set-back at the end of the century, caused partly by the decline in the demand for heavy draught horses; but a good recovery was made about the turn of the century. The first decades of this century were prosperous and this prosperity has been maintained, generally speaking, in the northern part of the watershed and in individual cases elsewhere. The population of all the townships, however, continued to decline until about 1920 and it is only in recent years that any gains have been recorded.

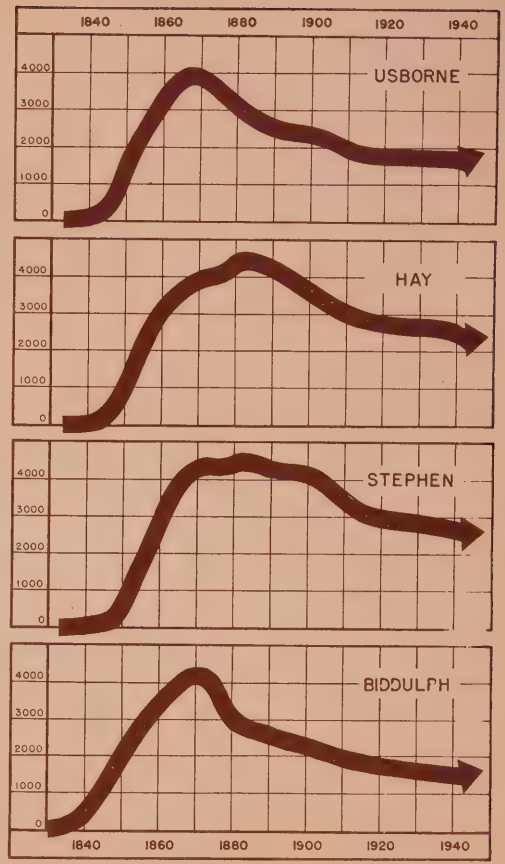
All the townships have now fewer people than in 1860 and in Williams East and Williams West the population is below that of 1849. This is at least partly due to the practice of extensive grazing by which the whole of once productive farms are turned into unimproved pasture. McGillivray Township now has about the same density of population as the two Williams'. There is some indication that the process of depopulation has been arrested, but if it had continued at the old rate for a few years longer these townships would soon have been nearly as empty of inhabitants as when the first settler, Asa Townsend, built his shanty in the wilderness of Williams West.



VILLAGE POPULATION



TOWNSHIP POPULATION



TOWNSHIP POPULATION

The building of the "Cuts" in the seventies and nineties opened areas of the "drowned" lands between Thedford and Grand Bend to agriculture and later drainage operations and modern methods have brought truck farming in this area to a very prosperous state. It is likely that this development will grow more important in the future and help to revive the rural life of this part of the watershed.

PART II—LAND USE

1. GENERAL CONSIDERATIONS

1. PURPOSE OF THE SURVEY

A survey is made to determine two things, first the kinds of soil, their extent and condition for agriculture, and second the distribution of land use. From these facts an estimate is made of the capabilities of the land of the watershed, and recommendations can be made for the use of the land.

2. THE RECONNAISSANCE OF SOILS

The soils of the watershed were classified on the basis of their physiographic origin and their natural internal drainage. Slope, erosion and other factors affecting land use were also distinguished and mapped on what is known as a reconnaissance scale.

3. PRESENT LAND USE

Four classes of land use were recognized and mapped, cultivated land, permanent pasture, woodlots and non-agricultural land which included wasteland, recreational areas and urbanized land. The extent and distribution of these four classes were recorded so that present use could be compared with kinds of soil, and by this comparison an estimate is made of the relative capabilities of the different soils.

4. DETAILED STUDIES OF SAMPLE AREAS

A detailed study is made of sample areas to determine as minutely as possible the relation between crops and soil types and conditions. The sample areas are in the form of long narrow strips, laid out so that they will contain as nearly as possible all the different kinds of land revealed in the reconnaissance survey.

5. DEFINITION OF SOIL

The soil is a living body. It is made up of unconsolidated mineral material, living microorganisms and the remains of dead plants and animals. It is formed by the interaction of living things, on and within the soil, and air and water with the mineral material. The soil provides the medium for the germination and growth of the plants that man uses. The quality of a soil is measured in terms of its capability to support the crops that man wishes to grow on it. The soils of the watershed, like most of the soils of Southern Ontario, have been formed under a climate much like the present one, and a covering of hardwood or mixed hardwood forest and are classified as gray-brown podzolic soils. A cross-section of soil would reveal several different layers of material, starting with the topsoil and going down to the parent material from which the soil is formed. Such a cross-section is called a "profile" and each soil type has its own distinctive group of levels or "horizons" and its own profile. The profile is studied to estimate the degree of erosion present over an area.

6. CLASSIFICATION OF SOILS

Soil series are identified in terms of profile development according to internal drainage in each association of soils with similar physiographic origin.

7. SOIL CONDITIONS

Classes of slope and estimated degree of erosion were determined to appraise erosion and erodibility of the soils.

8. METHODS OF SURVEY

The soil was examined wherever exposed on road cuts, excavations and also by opening up by a tiling spade or at depths of three feet by use of a soil auger. Aerial photographs are used as base maps and to determine natural boundaries.

2. DESCRIPTION OF SOILS

1. CLASSIFICATION

Soils were classified on the basis of two features, first, soil material and land form and second, profile development according to the effectiveness of internal drainage. Following are the soil classes:

2. SOIL OF THE KAME MORAINES

Is formed on deposits of sand and gravel on steeply sloping formations. Because of the coarse nature of the material the internal drainage is excessive.

3. WELL DRAINED SOILS OF THE CLAY MORAINES AND TILL PLAINS

The moraines have steeper slopes than the till plains, but both have a bouldery clay loam which is erodible and subject to depletion.

4. IMPERFECTLY DRAINED SOILS OF THE MORAINES AND TILL PLAINS

Are essentially the same as the well drained soils on the same land forms, but the heavy nature of the clay and the permanently high water table make drainage inadequate.

5. POORLY DRAINED SOILS OF THE TILL PLAIN AND MORAINE

Are formed on calcareous till or clay deposits in low lying pockets where there is no external surface drainage.

6. SOILS OF THE SPILLWAYS

Range from coarse gravels to fine silts. They are flat, poorly drained and not extensively used for agriculture.

7. SOILS OF THE ABANDONED BEACHES

Because these soils have a coarse texture due to sand or gravel, and because they are generally on sloping land or near a slope they are well drained or excessively drained. The profile is deeper than those of the clay soils.

8. SOILS OF THE LAKE CLAY PLAIN

Consist of clay loam over clay, stonefree, and ranging from well to poorly drained, depending on the other conditions.

Protective cover of sod, shrubs or trees would prevent erosion on this exposed shoulder of a small hill.

Well drained soil on the till plain with deep profile development. Note the very light (A2) horizon.

A soil profile is exposed in this open ditch near Exeter. The pale coloured band is the leached (A2) horizon. The soil is well drained till.

The human aspect of erosion and soil depletion. These skeletons of house and barn are in a region where the decline in rural population has been made more acute by failure of the soil to sustain its yield.

9. SOILS OF THE LAKE SILT PLAINS

The plain, once flat, has since been cut by valleys. The silt consists of large particles producing an open textured soil easily drained but subject to erosion.

10. SOILS OF THE LAKE SAND PLAIN

Consist of layers of sand of varying depths over the clay of the till plain or lake plain. These soils are well drained except where the relief is very flat.

11. SOILS OF THE CLAY VENEER TILL PLAIN AND SILT VENEER

Are developed on heavy stonefree clay over stony clay, on a flat plain which is imperfectly drained for the most part.

12. THE SILTY SOILS OF THE UPLANDS

Are silt loam types with a topography similar to that of the till plains and moraines. Internal drainage of the silt is better than that of the heavier material.

13. SOILS OF RECENT DEPOSITION

Include those of bottom land, depressions in the uplands and on the floors of some of the spillways, and in these there are accumulations of decayed organic matter lying on top of the mineral soil, forming "organic" soils—peat and muck.

3. PRESENT LAND USE

1. TYPES OF AGRICULTURE

Most of the farms on the watershed can be considered as belonging to one or another of four types of agriculture although there are farms which would not fit into any one of them exactly. Any of these major types merges gradually into the others and in any region farms may be seen which do not conform to the type of agriculture surrounding them. The types and their distribution are generally as follows:

2. MIXED FARMING WITH LIVESTOCK

In the north-east and east with Exeter and Lucan as centres.

3. BEEF FARMING

In the south-east and south with Ailsa Craig and Parkhill as centres.

4. MIXED FARMING WITH CASH CROPS

In the west with commercial outlets in Dashwood and Parkhill.

5. SPECIALIZED FARMING

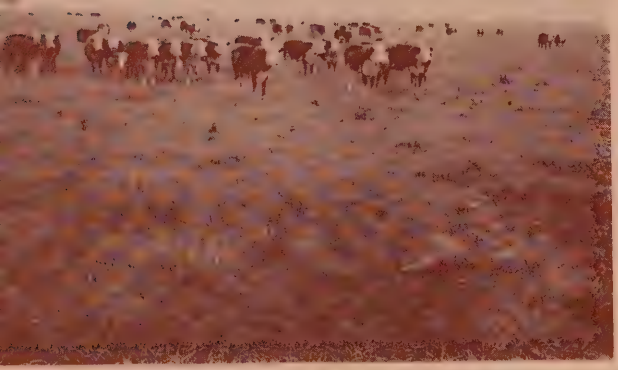
In the south-west with commercial centres in Arkona and Thedford.

6. PRESENT LAND USE CLASSES

Only four classes of present land use were recognized and mapped on the survey. They are:

(1) Cultivated land: this is land which is under cultivation at the time of the survey or can be recognized as being used in a crop rotation system.

The variety of crops on this farm near Khiva is typical of the farm economy on the till plains and moraines.



A good beef herd on permanent pasture on poorly drained land.

Typical agricultural land use. The woodlot in the background is on the back of the farm, a familiar feature of the landscape of the watershed.

(2) Pasture land: this includes land used for grazing which has not been cultivated or reseeded within the past five years.

(3) Woodlots: land covered by trees to the exclusion of tillage implements and which may be pastured.

(4) Non-agricultural land including wasteland, urbanized and recreational areas and airfields.

The actual location, extent and distribution of the land use classes is shown on the present land use map accompanying the full report.

PRESENT LAND USE

	Acres	Per Cent
Cultivated	214,500	50.4
Pastured	156,500	36.8
Wooded	48,300	11.3
Non-agricultural	6,580	1.5
Total	425,880	100.0

4. DETAILED STUDY OF SOILS AND LAND USE ON THE THEDFORD SWAMP

1. LOCATION AND EXTENT

The area lies about two miles north of the village of Thedford and extends northward to Grand Bend. It is a triangular area amounting to twenty thousand acres.

2. ORIGIN, HISTORY AND PROBLEMS

The swamp is contained between the bar and sand dunes along the present shore of Lake Huron and the sand bar which marks the shoreline of a post-glacial stage of the lake. This bay was cut off and gradually filled with sediment and vegetation to form the present swamp. Use was made by the early settlers of parts of the swamp for cultivation but they were hampered by the floods which are a regular problem of the operators of these organic soils.

3. THE SOILS OF THE SWAMP

Though the soils of the swamp include clay loam, loam and muck, all inadequately drained soils, it is only the muck which is used for specialized crops. There are three main bases of classifying this soil. First is the mineral material underlying it, second is the type, depth and stage of decomposition and third is the presence or absence of marl (chalky lime mixed with sediment). The usefulness of the mineral material is studied.

4. CLASSIFICATION OF SOILS

Ten soil materials were recognized and listed in the report. These are the constituents of the topsoil with which the farmer works. All the soils have poor natural drainage, that is, no real profile development can be observed. There are two main types of farms in the area: truck crop farms, specializing in onions, celery, sugar beets, peppermint and such canning crops as red beets, carrots

and spinach, and general farms, which include a wide variety of beef and dairy herds and cash cropping of sugar beets, grain, beans and flax. Most of the farms are tile drained, buildings and equipment are in fair condition, and much of the farm work is mechanized.

5. PRESENT LAND USE

Over 17,000 acres of the swamp are used, and ten different land use classes were identified, the largest single class being in grain, followed by pasture, both permanent and hay.

6. LAND USE ACCORDING TO SOILS

Future prospects of an area can best be determined by comparing the present use with the natural characteristics of the land. Three factors influence land use within the swamp itself. These are: (1) soil type; (2) artificial drainage and (3) accessibility. Truck crops are restricted to the deep organic soils and cash crops are grown on the clays and the shallow organic soils. Sugar beets are grown on both. The largest areas of intensive truck cropping are on clay-peat soils (with marl underneath) and on woody-peat.

7. FUTURE PROSPECTS

Further exploitation of organic soils is a possibility. Whether this is done depends not so much on the characteristics of the soil but on economic factors outside the region itself. Two crops were found to be in a stable position economically: onions and Thedford Dutch Sets. Mint growing can expand because domestic production is only a small fraction of Canadian consumption of the oil. Two major projects are necessary for expansion of operation on the Thedford swamp and even for sustaining present operations. These are drainage and flood control. There seems little evidence of early expansion of agriculture in the area except in mint growing. Flood control measures, therefore, are likely to be limited to those which will protect land, now under intensive cultivation, from summer floods. Improved drainage involves only those drains now in existence.

5. DETAILED STUDY OF SOILS AND LAND USE ON SAMPLE STRIPS

Knowledge of the relation of soil, crops and soil depletion which is detailed enough to use in planning land use, can only be done on a small area. By choosing two strips on different parts of the watershed, a fair representation of crops and soils was obtained. Most of the major soil groups of the watershed are represented in the strip. Natural drainage and soil profile development ranges from good to poor (with no organic soils represented). Slopes up to ten per cent were found. Types of farm included pasture farms for beef, mixed farms based on milk herds and mixed farms with emphasis on cash crop production. In mapping the soil, ten different kinds of material were recognized and five degrees of drainage and profile development. Slope classes and estimated degrees of erosion were also recorded. Each unit area of land which possessed similar features throughout was outlined by a boundary on the map.

A map showing distribution of crops on the various soils sums up the results of many years of experimentation by the farmers. The present land use pattern is believed to be the clearest evidence of land use capability. Two features are demonstrated in this detailed study. The heavy soils are preferred for the most intensive use. As these usually require artificial drainage, the pattern of land use is controlled largely by the artificial drainage. Pasture is usually relegated to the poorer soils or the naturally wetter soils that have not been artificially drained.

6. LAND USE CAPABILITY

Capability of soils is rated on the basis of present use and condition as well as application of what is known of erosion and soil depletion on these types of soil. Capability also depends on management and on location. A good deal of land on the watershed is under pasture and in the interests of conservation, should stay that way. There is also land which is now regularly cultivated which should, according to its capabilities be under pasture or more restricted rotations, so that it is pastured more. Availability of water is a feature of soil capability when pasture is considered as a possible use. No soil, however, can be considered by itself. In some cases soil may be inadequately drained naturally, but is in a location where artificial drainage is feasible. In other locations it may not be either possible or sound to drain. Therefore, in the favoured location it has a higher capability because it can be improved and in another location it will have a lower capability. Some soils are intensively used even though their capability is less by reason of erosion and soil depletion; their continued use at a high level of production cannot be expected and this would make their condition even worse. There is evidence of much erosion going on at the present time on soils which cannot safely carry the intertilled crops which are being grown on them.

7. RECOMMENDED LAND USE

1. BASIS OF CLASSIFICATION

Recommended use is based on capability and those practices which have been found suitable on different soils. There are four main methods which have been found useful in conserving soil and water. They are as follows:

(1) Reforestation: to maintain permanent vegetative cover.

(2) Long term pasture: to maintain permanent vegetative cover and at the same time support cattle.

(3) Conservation farming: the cultivating and seeding of sloping land on the contour, alternating drilled or intertilled crops in strips with grassland, provision of diversion ditches to remove surplus water from slopes and the grassing of waterways.

(4) Restricted rotations: elimination of intertilled crops where these promote erosion, maintaining sod for more than one year in a rotation and such practices as winter cover, green manure and field composting, to be carried on where soil is susceptible to erosion but not suitable for contouring.

The recommended use classes are as follows:

(1) Cultivated land, no restrictions.
(2) Cultivated land, no restrictions when drained.
(3) Cultivated land, on which conservation methods should be practised.
(4) Cultivated land, restrictions on intertilled crops.
(5) Long term pasture, cultivated once in six years for grain.
(6) Long term pasture.
(7) Woodland
(8) Special use.

2. CULTIVATED LAND, NO RESTRICTIONS

This is land which under present conditions is intensively used and on which no special practices, over and above good farm management, are necessary to retain it in good condition.

3. CULTIVATED LAND, NO RESTRICTIONS WHEN DRAINED

Much of this land is now under cultivation and a good deal of it is drained, so that it can carry the whole range of crops found in the region.

4. CULTIVATED LAND ON WHICH CONSERVATION METHODS SHOULD BE PRACTICED

The conservation methods to be followed are as follows:

(1) Contour cultivation: fields are laid out so that the plough and the seed drill make furrows and rows that are "on the level", that is, do not run up and downhill.

(2) Strip Cropping: this consists of laying out fields in alternate strips of cultivated crops and sod, each about four rods wide but varying with the slope.

(3) Diversion ditches and grassed waterways: all of the rain cannot always be induced to soak into the ground even under the wisest management. Provision must therefore be made to remove excess surface water with the least damage to the land. The main remedy to this problem is the grassing of all channels which regularly carry surface run-off. The diversion ditch is cut across the slope of a hill and leads to a grassed waterway running downhill.

(4) Restricted rotations, winter cover, green manure and field composting: The one feature of soil which, above all others, makes it resist erosion, absorb water and hold it is its humus content. Experiments have shown that soil in fallow or under corn resists erosion and holds water better when the previous cropping has added humus to the soil. Having sod cover for two or three years in five rather than just one is a soil building measure.

5. CULTIVATED LAND, RESTRICTIONS ON INTERTILLED CROPS

There are some crops which leave a good deal of the soil bare and require cultivation of the soil throughout the growing season. This leads to erosion when the soils are on sloping land.

6. LONG TERM PASTURE, CULTIVATED ONCE IN SIX YEARS FOR GRAIN

The soils in this class require building up. They are either lacking in humus or are in poor tilth, or both. On sloping land they are subject to erosion. Neither crop yields nor animal carrying capacity of pastures is high.

Windmills for watering cattle from wells are common. Both the uplands and the plains are favourably situated with respect to the prevailing west winds.

Dugout waterholes are convenient where there is a permanently high water table. This is a common practice in the upland pasture regions.

Feeding station, waterhole and bottomland pasture. Note the gullies on the banks and slopes induced by the trampling of the cattle.

7. LONG TERM PASTURE

Long term pasture means land which is prepared and seeded to grass and legume mixtures and used for grazing. When land is either relegated to pasture or specially seeded to pasture it requires further management. The three main features of good management are: (1) preventing overgrazing, (2) dressing with manure and (3) mowing to cut down weeds.

8. EXISTING WOODLAND AND REFORESTATION

Zones have been outlined for reforestation and preservation of existing woodland. Smaller belts of woodland are also indicated. These are not large enough to be included in Authority projects but include parts of farms. Therefore, the maintenance of existing woodlots and reforesting of plantable land is a phase of farm management.

9. TRUCK CROPS, MARKET GARDENS AND ORCHARDS

Organic soils and some of the very light soils are most suitable for the establishment of market gardens and orchards. Orchards on sandy soils expose the land to erosion. There is a need for study of modern methods of management in orchards in the watershed.

10. PERMANENT VEGETATION

Most of the spillway soils are specially recommended for either pasture or forestry.

11. WATER SUPPLIES FOR GRAZING LAND

Emphasis has been placed throughout this report on grassland as a conservation measure, which would be used for pasture and which brings up the problem of water supplies. Sometimes well water is not available or drilling is too costly. There are two alternative sources of water; surface run-off and ground water in shallow dugout water holes. Investigations into suitability, type and cost and management of farm ponds are necessary in rounding out a conservation program. Proper management of surface water supplies calls for the exclusion of cattle from the margins of watering places.

12. EFFECTUATION OF A PROGRAM OF SOIL CONSERVATION

Except where large pieces of land are required by the Authority or the county for reforestation, all changes in land use would be made on individual farms.

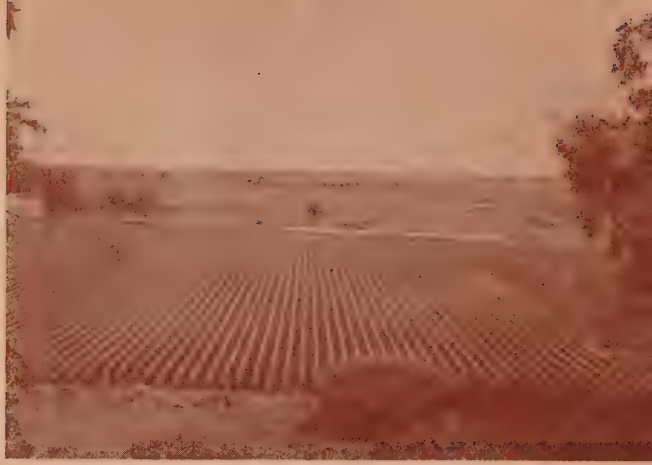
13. FARM PLANNING

Farm planning is the first step in bringing about wise land use. Technical advice is available from the Ontario Agricultural College through the county representative. The River Authority can help to get farmers and planners together and to arrange for demonstrations in key localities.

14. DEMONSTRATION

Demonstration is the proven way to introduce farming methods. This can be done by cooperation with private farmers and by operations on land owned by the Authority.

A wide view of marsh cropland seen from the gravel ridge on the south side.



Peppermint oil is extracted in this distillery.

One of the ditches draining the marsh.

15. EXPERIMENTATION

Experimentation is necessary to find out just what practices and methods are suited to various soils. Investigation is suggested into the establishment of good sod on slopes too steep for cultivation and into fertilizer requirements, seed mixtures and tillage practices on the heavy clay soils.

16. EDUCATION

Is the most important feature of a conservation program. Suggestion is made for a conservation education program among young people.

17. DISCUSSION

Has been recognized as a means of education in the Farm Forums which are now a regular feature of rural life.

18. COOPERATION

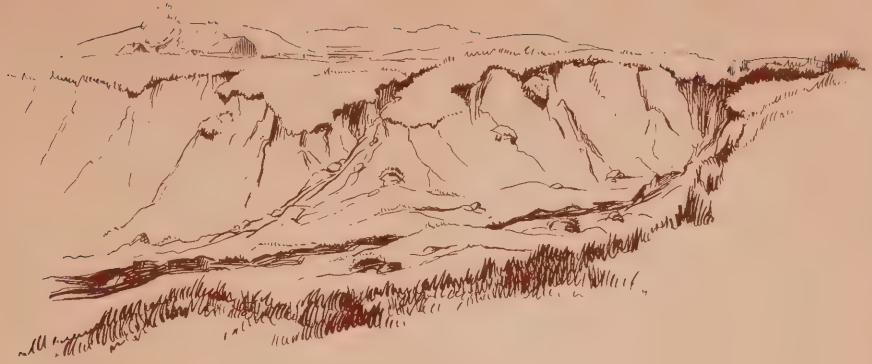
Is the means of achieving goals that cannot be attained by the individual. The men who first brought the land under the plough were pioneers. Those who strive to restore and maintain the fertility of the soils, the conservationists, are pioneers of the future. The adjustment of land use to soil capability is a very long term program. Knowledge is the first step. The maps and discussion presented in the report are intended to provide some of that knowledge.

8. GULLIES ON THE LAKE HURON SHORE

The shore of Lake Huron from Grand Bend almost to Clark Point rises as bluffs from fifty to seventy-five feet high. When the natural vegetation is removed from the face and crest of these bluffs they become very subject to erosion. Where run-off and drainage from inland is accelerated by means of ditches and tile and the water allowed to run over the cliff face uncontrolled, gullies cut their way into it in an alarming and dangerous manner. At the time of the survey twenty-eight of them were examined within a distance of ten miles. Most of them are man-made. The factors involved in their rapid cut-back are as follows:

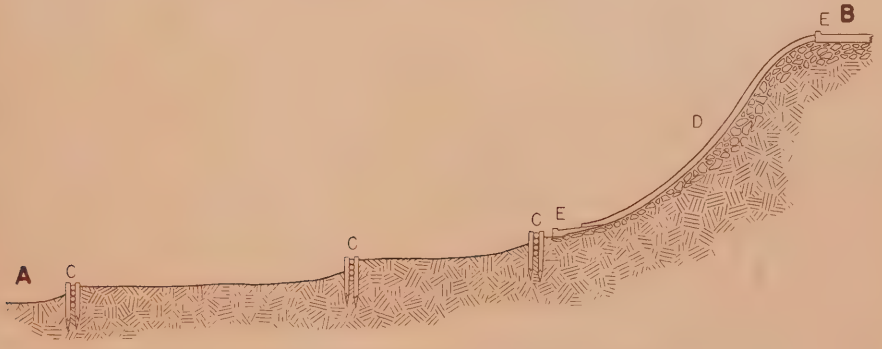
1. Removal of forest cover
2. Increased and accelerated drainage
3. Installation of drain tile
4. Not providing a conduit for carrying the water down the cliff face to the water level
5. Straightening of the drainage channels
6. Cultivation of fields right to the edge of the gully.

Some attempts to arrest the progress of some of the gullies have been made both by the Ontario Department of Highways and by private owners. These have been spasmodic and inadequate, and in some instances have even aggravated the condition. When only one phase of protection is carried out at a time or only part of the gully is treated the work done may be rendered useless in a very short time by erosion taking place on the unprotected parts. In all work of this nature, a plan must be made for each gully and the work to be done outlined in all its



A typical gully caused by accelerated run off, tile drainage with no protection of the outlet and removal of the natural cover of trees.

The same gully showing the mechanical features of erosion control, namely concrete flume with aprons at the top and bottom protected by rip rap on the sides and small check dams. Ground cover of trees, shrubs, vines and plants must be established on the slopes.



Profile of the same gully from A to B showing the position of the mechanical features — flume (d) aprons (e) and check dams (c).

GULLY EROSION AND CONTROL

phases beforehand. This should include consideration of, and plans for, one or a combination of the following:

1. Sumps
2. Flumes
3. Check Dams
4. Aprons
5. Retaining walls
6. Rip rap
7. The spreading of brush, hay, fence wire and debris
8. Sowing cover crops, such as sweet clover and alfalfa
9. Planting trees, shrubs and vines
10. Sodding

When the plan has been prepared and the required work properly integrated and decided upon, it should all be undertaken at once. It should be completed as soon as possible in the first season and carefully maintained in constant repair thereafter until thoroughly established.

PART III—FORESTRY

1. THE FOREST

The original forest of the Ausable Watershed was predominantly hardwood. The till plains and moraines which comprise most of the watershed were covered with sugar maple-beech forest with hickory, black walnut, black cherry and numerous other southern hardwood species. The first range of sand dunes in the Pinery area supported only dwarfed, hardy trees which could stand the buffeting of the winds and the shifting sands, and only common juniper, red cedar, red pine and balsam poplar were able to survive at all. Behind the first range of sand dunes conditions favoured red and white pine which covered the whole area, along with some poor quality oak of various species. In the moist depressions between the dunes near Port Franks, silver maple-white elm swamps occurred and white cedar stands were found. The poorly drained glacial spillways throughout the watershed supported swamp types of forest, including silver maple, white elm, some black ash and cottonwood, while the wettest of these valleys were covered with tamarack and white cedar. The southern part of the watershed supported some types of trees, such as tulip tree, chestnut, chestnut oak, sassafrass and flowering dogwood, which reach their northern limit here.

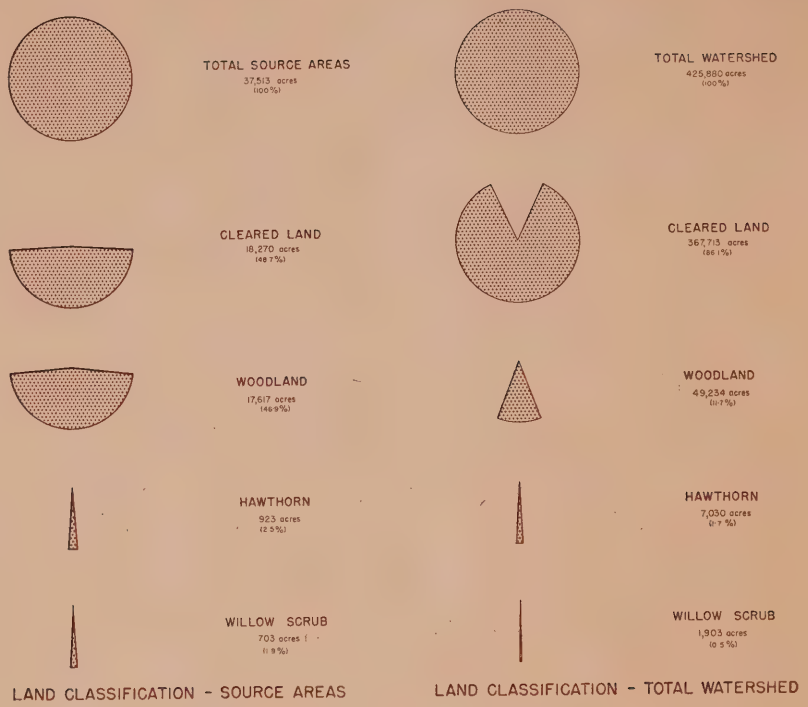
The attitude of the settlers to the forests was naturally antagonistic as the land had to be cleared before any settlement could be accomplished. Most of the land in the Ausable Watershed is of high agricultural value and was largely covered with hardwood trees for which there was very little market. Because there was very little pine, and because the Canada Company, which owned and sold the Huron Tract covering most of the watershed, tried to maintain a monopoly over sawmilling, lumbering was never very highly developed on the watershed.

There was a limited export of squared timber and masting to Britain, and the sawmills turned out quantities of other wood products for local use, including firewood, staves, tanbark, fencing, implements and material for roads. At the present time there are five sawmills and three planing mills in operation in the watershed, with greatly varying capacities. Most of the softwood required by industry is imported. Maple sugar formed the staple sugar for the pioneers, but maple syrup was not made in any quantity until 1910, and since then the production of maple syrup has steadily decreased. Potash was made for soft soap, and communal asheries as well as individual ash houses were an important feature of pioneer life.

2. PRESENT WOODLAND CONDITIONS

The actual measurement of the woodland area within the watershed made in 1947 shows a total of 49,234 acres or 11.6 per cent of the total area.

Almost the entire watershed lies within the Great Lakes—St. Lawrence Forest region. The south and western portion is favourable for many species which find their northern limit here, including tulip tree, mockernut and pignut



hickories, dwarf chestnut, and other species commonly found in more southerly climates. Sugar maple and beech are the dominant species throughout the area, and with them are basswood, white elm, white ash, red maple and red, white and bur oaks. 94.9 per cent of the total forest of the watershed is hardwood, 3.3 per cent is mixed forest, and only 1.8 per cent is pure coniferous.

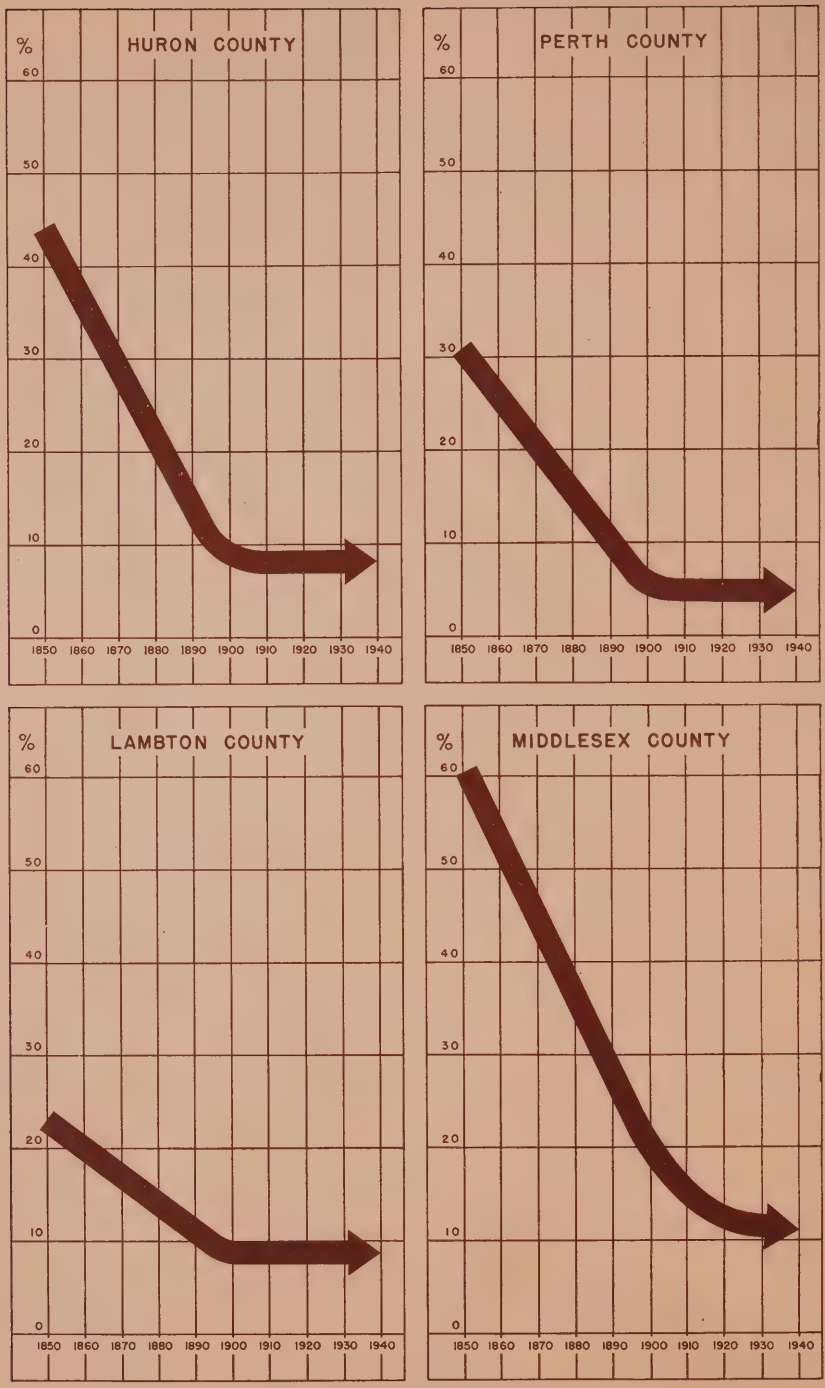
Twenty-four forest cover types are found in the Ausable Watershed. Conifers are almost non-existent with the exception of red pine found in the Pinery. Elm swamp types which covered large areas around former Lake Burwell, near Port Franks and the glacial drainage channels have survived pretty well throughout the watershed. Cedar and tamarack swamps which were scattered throughout the area have virtually disappeared; sugar maple types are found fairly generally, especially in Williams East and West, McGillivray and Bosanquet Townships. Oak types occur almost exclusively in the Pinery, but the trees are of poor form and useful mainly as firewood.

Grazing in farm woodlots is very general, indicating the low value placed by the average landowner on his woodland as a permanent crop. The wooded areas in the watershed are not extensive, but they do aggregate nearly 50,000 acres and are worth preserving and improving. No systematic method of hand-

Type 9—White pine was an abundant type in the Pinery and occurred on the light soils bordering the Ausable Valley. Today only fifty-eight acres remain.

Type 57—Beech-sugar maple was undoubtedly the most extensive type covering most of the best agricultural land. It still makes up twenty-two per cent of the woodland. This is a mature (H2) stand.

Type 3—Red pine at one time covered most of the Pinery but did not occur elsewhere in the watershed.



PER CENT WOODLAND

CENSUS OF CANADA FIGURES

ling them has been used in the past, little effort has been made to combat fire in the vulnerable area of the Pinery and only 8 per cent of the woodland is fenced from cattle.

3. FOREST CONSERVATION MEASURES IN PROGRESS

The largest area of land in the watershed suitable only for the growing of trees is the Pinery, in which the County of Lambton established the beginnings of a county forest of 630 acres in 1940. For some years now the Department of Lands and Forests has divided Southern Ontario into zones, each with its Zone Forester whose duty it is to give advice and assistance to private individuals and municipalities on the management of their woodlands and the establishment of plantations. There are two zones covering the Ausable Watershed, the first of which includes Huron and Perth Counties, with the zone office at Stratford and the other covering Lambton and Middlesex Counties with the office at Chatham. There are several methods of encouraging the development of forest areas in Ontario:

1. The Municipal Reforestation Act provides for material aid in establishing and maintaining municipal forests.

2. Demonstration plantations, of which there are none in the area at present, but which are highly recommended for the future.

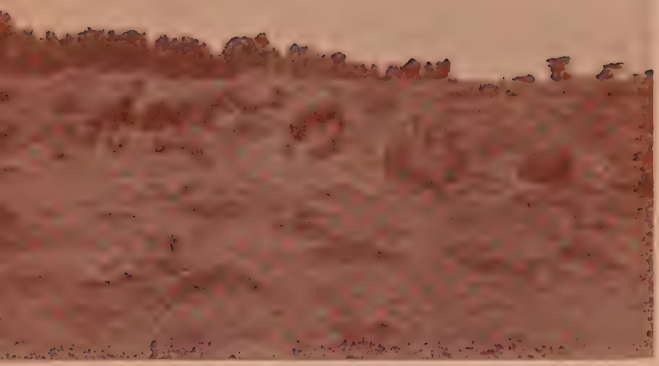
3. Demonstration woodlots, which are privately owned areas of woodland. There are five in the watershed, one in each of Bosanquet, London, McGillivray, Warwick and Williams East Townships varying from 10 to 45 acres in extent.

4. School forests, to be planted and cared for by school children. Trees have been sent out to schools in all four counties in the watershed, but these have been distributed to children for planting on the home farm to form windbreaks and shelterbelts—no school forests have been established to date.

4. FOREST CONSERVATION MEASURES REQUIRED

The most important conservation measure required on the Ausable Watershed is the establishment of several forest areas to be called the Ausable Forest under the Conservation Authority, which will serve to cover the natural water storage areas of the river valley. Thirteen areas have been designated for the Forest, of which the largest and most important are the Pinery and Hay Swamp.

As much as possible of the Pinery area should be acquired by the Authority immediately to prevent its acquisition by private owners. It is a Multiple Use area in which the possibilities of recreation, wildlife and forestry should be carefully apportioned and special areas set aside for each. A small provincial park already exists at the south-west end, but the whole of the rough land of the dunes should be maintained under proper forest management. Almost all of this area is wooded, mostly with poor oak, which should be cut to provide thousands of cords of fuelwood each year. A forest management plan to eliminate fire would enable red and white pine to survive and reproduce themselves. Very little actual tree planting would be required except on the open areas, which could very easily be reforested to pine, or poplar, on the areas where blow holes already exist.



Poorly drained sand areas such as those in Hay Swamp cannot be profitably maintained as pasture and are soon invaded by scrub willow. Cattle should be excluded and the tree cover restored.

This woodland has been ruined by cattle. All regeneration has been destroyed, sedges and low grade pasture grasses cover the area and the few remaining trees will soon die. Exclusion of cattle and discing of the soil would restore woodland in time.

Clear cutting is a vicious practice which soon makes land non-productive if followed by grazing. Fortunately, it is a practice which has almost died out in the Ausable Watershed.

SOURCE AREAS
AND
REFORESTATION LAND

LEGEND

1 HAY SWAMP
2 HARPLEY
3 PINERY
4 SMITH LAKE
5 RIVER BEND
6 ARKONA
7 McINNIS
8 PARKHILL
9 BORNISH
10 KEYSER
11 AILSA CRAIG
12 GLANDEBOYE
13 STAFFA

SCALE: MILES

1 0 1 2 3 4 5

Hay Swamp comprises over 10,000 acres of poorly drained sand which forms the headwaters of Black Creek. 2,900 acres are already wooded, mostly with swamp types including silver maple, white elm and poplar, 600 acres are covered with a dense growth of scrub willow and in the south-east corner there are 148 acres of hawthorn. Forest cover should be restored of a type which will not be affected by water standing on the land for some weeks in spring, an unavoidable condition, since the area is virtually impossible to drain and may be flooded for a period of time each spring if the proposed flood control dam is built.

5. FOREST INSECTS AND DISEASES

In any project, such as is proposed for the Ausable Watershed, careful consideration should be given to the prevention of insect outbreaks and adequate arrangements made for the immediate application of control measures when these become necessary. There are many fundamental principles, which if applied will greatly lessen the destructiveness of insects and diseases. It should be recognized that protection against leaf-feeding insects is very desirable since defoliation of a tree weakens it and thus makes it more susceptible to attack by bark-beetles and wood-boring insects, as well as by organisms which do not usually attack healthy trees.

6. LAND ACQUISITION

The problem of land acquisition in any part of agricultural Ontario, where practically all the land is privately owned, is one which requires careful approach. The only parts of the Ausable Watershed where large scale transfers of property from private ownership to a forest authority would have to be made are those areas which are recommended as source areas and reforestation land. Where the counties of Southern Ontario have undertaken large scale reforestation programs, practically all their purchases have been made by private sales, which of course is the most satisfactory method to follow. Some land may be acquired through tax-delinquency, and as a last resort, especially in establishing a unified block, it might be necessary to expropriate.

It would be impossible to give an accurate figure for the total purchase cost of all land in the proposed forest without consulting the owners of the individual parcels. However, a table of cost per acre of lands purchased for reforestation in Southern Ontario by different counties, ranging from $2.30 to $16.62 with an average of $4.47 per acre, gives a rough indication of what the cost of acquisition of land for the Ausable Forest is likely to be.

In many parts of the Pinery sufficient seed trees remain to reforest the area naturally if fire is kept out and would be aided by the removal of the oak.

On the peat soils adjacent to Smith Lake fire converts the area which once bore trees into a dense tangle of scrub willow and alder.

A plantation of hardwoods 19 years old near Grand Bend.

A corner of the small Lambton County Forest where red pine trees have been planted mostly under the native oaks.

Recommendations

SOILS AND LAND USE

1. That contour tillage, strip-cropping, grassed waterways and restricted rotations be established on land designated as suitable for conservation farming on the Map of Recommended Land Use, and that demonstrations be arranged in these areas to promote practices of conservation farming.

2. That farm woodlots be fenced from cattle and that plantations be established wherever feasible on steeply sloping land and gravelly soils designated as plantable.

3. That permanent sod be established with pasture improvement on land designated for this purpose and that pastures be managed according to sound principles, including mowing to reduce weeds.

4. That intertilled crops, which expose soil to erosion, be restricted on land which is sloping, but not suitable for contour tillage.

5. That long rotations of sod and grain be established on clay and silty soils of the uplands to resist erosion and to build up organic content and fertility of the soil.

6. That ponds and streams used for watering stock be protected from trampling and pollution by cattle.

7. That the River Authority stimulate and guide all individuals and agencies concerned in the watershed to formulate and carry out a policy of adjusting Land Use to Land Capability.

8. That further research and investigation be made (1) in comparing Land Use to Soil Type and Erosion; (2) management of pastures and long rotations; and (3) methods of increasing organic content of soils by green manure crops, field composting and more efficient use of stable manure and plant waste.

9. That the River Authority support a program of education and publicity to acquaint the public, especially youth, with Land Use Problems and the methods of remedying abuses of natural resources.

10. That a gully control demonstration be carried out on the north half of Lot 9, Concession X, Township of Williams East.

FORESTRY

1. That the Ausable Forest of about 37,513 acres, comprising 13 areas of marginal and sub-marginal land, be established by the Authority to protect the natural water storage areas of the watershed and form the basis of a sound forestry policy for the watershed.

2. That a fire protective system be established under the Authority which will regulate the burning of slash and peat on private land and that a fire protective system be set up to fight fire anywhere in the watershed, but particularly in the "Pinery".

3. That the Authority expropriate all tax delinquent land subject to the regulations of the Municipal Act.

4. That natural regeneration be encouraged wherever possible and that open areas be planted where necessary.

5. That reforestation of privately owned land be encouraged in every way possible, particularly on blow sand, glacial beaches and poorly drained land.

6. That counties and townships be encouraged to establish and extend the forests within their boundaries.

7. That schools within the watershed be encouraged to enter the Provincial School Forestry Competition.

8. That the Authority inaugurate a scheme to aid farmers in fencing their woodlots similar to that adopted by the County of Halton.

WATER

1. That for flood control on the Ausable River the following works be carried out:

MAIN AUSABLE SYSTEM

The Lesser Port Franks Improvement Channel.

(Scheme A.1 (a)—$109,000.00). (With Breakwaters—$276,396.00).

PARKHILL CREEK SYSTEM

The Lesser Old River Bed Improvement.
(Scheme B.1 (a)—$276,501.00).

If a greater degree of protection is desired such as against spring floods of the 1947 magnitude, it is recommended that the following works be carried out on the two systems:

MAIN AUSABLE SYSTEM

The Lesser Port Franks Improvement Channel and the Arkona Dam (60 feet) and Reservoir.
(Scheme A.2 (b)—$999,454.00).

PARKHILL CREEK SYSTEM

The McInnis Dam (31 feet) and Parkhill Dam (29 feet) combined with the Lesser Old River Bed Improvement.
(Scheme B.2 (b)—$884,268.00.)

2. That for summer flow a dam be constructed at Hay Swamp at an estimated cost of $200,000.00.

3. That a number of small dams (listed in Table H-4 following Page 52 in the full report) should be planned for the future in order to increase summer flow and for deep seepage for the watershed.

WILDLIFE

1. That farmers be encouraged to improve land for wildlife by the elimination of grazing of woodlots, by selective rather than clear cutting, by planting small groups of trees and field boundary hedges and by planting wildlife food patches.

2. That the streams of the watershed be improved for muskrats and fish by any means capable of inducing permanent summer flow and by planting the stream banks with alders and willows.

3. That consideration be given to a plan for decentralized control over the setting of muskrat trapping dates to overcome the effects of differences in climate in different seasons.

4. That the season on muskrats be closed for one year.

5. That where the Authority requires extensive source areas, the right to trap for several years in succession be leased to individual trappers.

6. That consideration be given to the protection of predators of the meadow mouse near reforested areas, particularly those hawks and owls known to feed chiefly on mice.

7. That the introduction of fish into the watershed be restricted to those parts of the river shown by the survey to be suitable for the species concerned.

8. That owners of streams listed as suitable for speckled trout should be encouraged to improve them by constructing small trout ponds and by other methods.

9. That the fishing in any such impoundments be managed on a sustained yield basis.

10. That the Conservation Authority urge the Dominion Government to examine Smith Lake, Lambton County, with a view to safeguarding its future as an important stop for migratory waterfowl.

RECREATION

1. That the Township of Bosanquet consider the passing of a Zoning By-law, (pursuant to Section 406 of the Municipal Act of Ontario) for the control development and use of 8,970 acres of the Lake Huron Beach and "Pinery" area, as shown on the Recreation Map.

2. That three areas of beach and forest in Bosanquet Township, totalling 1,980 acres, be acquired and administered by the Conservation Authority for public use.

3. That 370 acres of the Ausable River Gorge be acquired by the Conservation Authority for a park to be known as the Ausable Gorge Park.

4. That six small areas of from one to five acres be acquired for the public as picnic sites.

5. That steps be taken by the Conservation Authority to educate the public to avoid the dumping of refuse and garbage on sideroads and beaches.

PART IV—WATER

1. THE RIVER

The names used by the original Indian inhabitants—Hurons, Neutrals and Fire Indians—to designate the Ausable River appear to be unknown. In 1819 it is reported that the Chippewas of the neighbourhood called it "Nagan-sippe", meaning sandy river. The French named it La Riviere aux Sables, which translated means "River with the Sands" (i.e. the sand hills near the mouth). This name has been corrupted through the years to "Ausable", which retains the French flavour, but with much simpler spelling.

The River Ausable drains 665 square miles of land, east of Lake Huron and near the southern extremity of the lake. The mouth of the river is about 36 miles south of Goderich. The sources of the main river are in Perth County, near the Village of Staffa, at an elevation of about 1,075 feet above sea level. The direct distance from this source area to the lake is only about 20 miles and Black Creek, a tributary which joins the river west of Exeter, has one of its sources near Zurich only 5½ miles from the lakeshore.

The Ausable originally flowed about 110 miles before reaching Lake Huron, following a course of which the outline has aptly been likened to that of a barbed fish-hook. After flowing south from a little west of Exeter to beyond Clandeboye near Lucan, the river swept westwards in a wide half-circle and then flowed northward from near Arkona till it was about a quarter of a mile from the lake at Grand Bend. Here the river made another sharp turn through about 180 degrees and flowed south-west behind the sand hills for about 12 miles until it was able to make its way through them to the lake. In 1873-5 the course of the river was altered by cutting a channel from a little below the boundary between McGillivray and Williams West Townships to Port Franks, cutting off the "Bend", most of which still served as the channel of Parkhill Creek until 1892, when another Cut was made at Grand Bend through the old portage, so that this creek now drains into Lake Huron independently of the main river.

Floods have always been a characteristic of the Ausable system; the lowlands in McGillivray, Stephen and Bosanquet Townships have been regularly inundated for many centuries, while most of the rest of the river shows the "Flats" or flood meadows, and old flood channels which are characteristic signs of flooding to be found on most Ontario rivers. It is evident that a great deal of soil and forest debris was brought down in the remote past by the floods and deposited in the low areas, blocking long stretches below the Gorge with logs and silting up the channel between Grand Bend and Port Franks.

Government Engineers at various times have attempted to control the river floods, but these measures were greeted with scepticism by the inhabitants, because in spite of them, the area about the lower reaches of the river have continued to flood at intervals. Only control measures which include the whole watershed can lessen the probability of flood damage on the lowlands near the mouth of the river. The cuts afforded some relief, but at best it was temporary, and some method of controlling run-off higher up is evidently needed to relieve the situation in the "Klondyke" area.

In the early times, few of the villages were exposed to flooding, probably because their sites were chosen with floods in mind, but the Parkhill Creek, small as it is, still manages to inundate a part of Parkhill, the foundry and the neighbouring houses often having a foot or two of water over the lower floor.

There are several factors affecting floods; the surface slopes drained by the Ausable, Parkhill Creek and their tributaries have a fairly high gradient. The part of the watershed between Lake Huron and a line through Arkona, Parkhill and Mount Carmel has an average slope of about 28 feet to the mile. The rapid run-off of this area is blocked by the sand hills and forced to spread out over the flats, until it can find its way through them to the lake. Another factor is the nature of the soils. The rate varies from rock, which has no absorbent power, through the heavy clays to sand, gravel and swamps, swales and lakes, which have the minimum of run-off, unless already full of water. When the ground is frozen or saturated at the time of the rainfall, the water will run off rapidly, while if a rainfall follows a period of drought, the rain will be absorbed to capacity before there is any run-off at all. Then, the extent of forest cover has an important effect on the natural water storage capacity of any area. However, the extent of this is hard to determine, as floods do occur in an area which is largely covered with forest. The Ausable Watershed was once generously supplied with swamps, but these have largely been drained, and the only lake in the area is Smith Lake, which is a small remnant of Lake Burwell. Much of the centre of Hay Township was covered with swamp in 1856, and a large area still remains which is ideally suited for summer flow storage. Ice jams at the mouth of the river and high lake levels also contribute to floods.

Low summer flow is also of long standing on the Ausable, but the situation in this regard has grown considerably worse since the country opened up. There was once an abundance of good streams all summer, but now most of them are dry in the summer months. A good program for the protection of source areas could do a great deal to improve the summer flow, though it could not be expected to make every creek clear, cold and permanent. Sluggish streams and standing pools may become a menace to health even in an area without large towns.

The protection of source areas and the control of floods would be of great benefit to the Ausable region, as it would to any part of the Province.

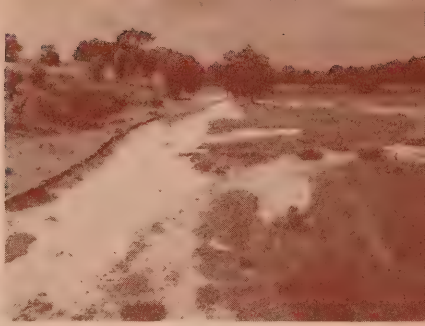
2. GROUND WATER

Ground water is that water which is absorbed into the earth. It is the water that is primarily responsible for the continued flow of surface streams and supplies, to a very great extent, our domestic and industrial needs.

There is, in general, an upper limit within the earth's crust below which the permeable rocks are saturated; this upper limit is called the water-table and forms the surface of the zone of saturation. Nearly all the ground water is derived from the atmosphere; it reaches the earth in the form of rain or snow. Part of it is carried away by streams as surface run-off, part evaporates, and the rest sinks into the ground ultimately to be added to the ground-water supplies.

The water that sinks into the ground finds its way downward until it reaches

The Little Ausable near Clandeboye "Teetotal dry", September 10th, 1947. Looking upstream from the Highway to the old bridge on the "London Road". The channel has been straightened.



The Old Ausable at the site of Brewster's Mill.

Logs in the bank of the Ausable near Thedford. These may be part of the logs which covered the river "like a causeway" in 1819.

Spring east of Staffa, Hibbert Township. One of the higher sources of the Ausable River.

the ground-water level or until it comes into contact with a layer of rock which stops its passage, when it is called perched water. If the ground-water level is at or near the surface there will be a lake or swamp. If it is cut by a valley, there will be a stream.

Though on the average over 420,000,000 gallons of water fall on each square mile of land each year in south-western Ontario, the ground-water supply is not inexhaustible. So long as the annual amount of water reaching the zone of saturation is equal to or greater than the quantity withdrawn, the ground-water supplies will not materially decline. However, this situation does not obtain in the Ausable, where once permanent streams are now dry, swamps have been drained, and wooded areas cleared which should have been left covered.

The present geological formation of the area was created by the glaciers which carried along with them great quantities of loose rock which they deposited when they retreated by melting. This material is called drift, and is made of boulders and pebbles of various composition and size embedded in a mass of clay. Intermingled with this and also lying above, below and between successive till sheets are beds and pockets of water-bearing sand and gravel. Throughout the greater part of south-western Ontario most of the ground-water supplies are directly associated with the glacial drift.

Huron County possesses a sub-surface which is very favourable for ground water. Bayfield, Lucknow, Zurich, Clinton, Seaforth and Wingham secured community supplies from wells. Exeter is dependent on springs. Lambton County is not so fortunate, and during the 1944-45 drought there was much water-hauling. Petrolia gets water from Lake Huron, which indicates that there are very poor sources of ground water in this region. No difficulty in obtaining supplies of water is found in Middlesex County, much of which is supplied with drilled wells, though there is always a possibility of finding salty water in wells drilled into bedrock. Wells drilled to or into the bedrock of Perth County are widespread and numerous, which may be an indication that ground water is scarce, but there are believed to be no immediate ground-water problems in this county.

3. HYDRAULICS

1. THE FLOOD PROBLEM

(1) NATURAL CONDITIONS

The serious flood problem on the Ausable Watershed is confined to an area of approximately 6,920 acres situated in the low-lying land inshore from the sand dune area near the original mouth of the river. Three areas, which are usually considered separately, are the hamlet of Port Franks, the Thedford Flats, and the Klondyke area of which the Haig Farm forms a large part. A fourth area which is quite local is Parkhill Village. This constitutes a nuisance flood and disrupts some industries for a short time but is not of the magnitude of the other three. Before dealing with these sections separately it would be well to review the history of this part of the watershed and particularly the natural features of the area before it came under cultivation.

The flats are believed to have been represented by a bay in the shore of a higher post-glacial stage of Lake Huron, which was cut off from the lake by a


PLAN OF
LOWER AUSABLE RIVER
SHOWING
LAKE BURWELL & SURROUNDING SWAMP
ABOUT 1840
NATURAL FEATURES IN 1840
SWAMP
FOREST
SWAMP FOREST BOUNDARY
DEVELOPMENT SINCE 1840
CULTIVATED LAND
SCALE OF MILES
0
1
2
GRAND BEND
No. 81 HIGHWAY
BREWSTER'S
PINERY ROAD
KLONDYKE ROAD
SMITH
LAKE
No. 21 HIGHWAY
KLONDYKE ROAD
THE CUT
THE CUT
PORT
FRANKS
No. 82 HIGHWAY
LAKE HURON

bar, which forms dunes along the present shore. This lagoon became practically filled with alluvial and peat deposits leaving what was originally Lake Burwell, approximately ten feet above the level of Lake Huron.

In addition to the large area occupied by Lake Burwell itself it will be seen that the area immediately surrounding the lake was marsh thickly covered with aquatic plants, and beyond this was an extensive swamp forest, composed of soft maple, elm, cedar, tamarack and willow. The whole area therefore was originally wild swamp flats merging with the lake which was periodically covered by flood waters in spring and summer, as they debouched into this low-lying basin. Thus, this old flood area, like so many others on the rivers of Ontario, belonged by ancient right to the river, and by the gradual encroachment of farming, necessary and useful as it is, involves a project of protection which is difficult to solve, because in doing so, man is pitting himself against the powerful forces of nature. By this, it is not intended to imply that such flood problems cannot be solved, but it should be borne in mind that where nature in the form of large rivers is brought within bounds, the cost is usually excessive, and sometimes the money required to accomplish such control outweighs the benefits to be achieved. Where this is the case, some measure of relief can be given, but usually a compromise must be made amounting to half measures.

Because this part of the river valley was known to have flooded in early times to the extent that passage up the lower reaches was well-nigh impossible owing to the accumulation of debris in the Lake Burwell section, it can be truthfully stated that flooding of this area can be considered an act of God; and, therefore, as far as these lands are concerned, the damage is comparable to that of hail in the western provinces and late and early frosts in the tobacco lands.

(2) SETTLEMENT AND DRAINAGE

When it became known that these lands were desirable for agricultural purposes, drainage was undertaken on a large scale. First, in 1872-5, the Canada Company built a cut along its present course to Port Franks, thereby draining Lake Burwell and creating an area known as the Thedford Flats. This cut diverted all the water from the main Ausable and allowed it to pour down directly to the old mouth of the river, seriously increasing flood hazards in the above village.

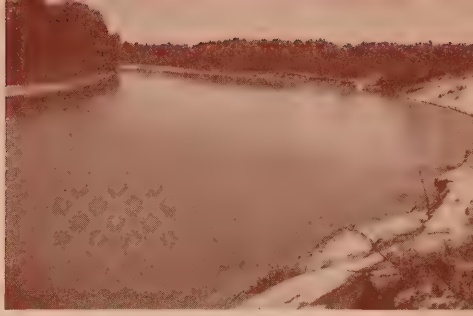
In 1892 another cut was made at the hairpin curve at Grand Bend, which together with the cut made in 1875 virtually separated the Ausable River into two systems—the main Ausable flowing directly into the lake at Port Franks and the Parkhill Creek and its tributaries flowing down the old channel to Grand Bend.

(3) THE FLOODED AREAS

(a) THE THEDFORD FLATS

This reclaimed marshland is very fertile and returns are high from specialized crops of celery, onions, root crops and peppermint. Of the 2,450 acres affected by the 1947 flood, 77 per cent (or 1,890 acres) is under this intensive cultivation. The remaining 560 acres would be suitable for the same crops if they were broken up.

Ausable River at Port Franks.



The "Cut" upstream from Bluewater Highway. Start of sandhills with old Lake Burwell bed in the background.

Junction of Parkhill Creek and Old Ausable River.

Old Ausable River at the Huron-Middlesex County line.

The greatest damage is done in the old Lake Burwell area by summer flash floods. Breakup freshets are accepted as inevitable and even welcomed for the fertilizing effect of the silt deposited, as well as the supply of sub-soil moisture ensured. In addition, they occur before the ground is normally workable so that there is little loss of the farmer's time. The summer floods, although lower and less extensive, cause heavy losses to sown crops, making re-sowing or substitution of a quicker growing crop necessary. The 1947 June floods, though only reaching an elevation of 585 feet, 5 feet above lake level at that time, covered 500 acres in the most heavily cultivated parts. It affected a large number of growers as part of this area is worked in 10 and 20 acre plots by villagers of Thedford and neighbouring farmers.

(b) THE KLONDYKE AREA

The Klondyke area consists of 7,500 acres, about half of which is under cultivation, on the old Ausable channel and lower Parkhill Creek—locally known as the "Ptsebe"—and includes the greater part of the flooded area of 4,470 acres or 7.59 square miles (1947).

With the exception of a small amount of water which overflows down the old Ausable channel from the head of the cut, all the flood water comes from the "Ptsebe" system and two small creeks which empty into the old Ausable below the "Ptsebe".

Spring flood water reaches an elevation of 592 feet—12 feet above Lake Huron and 2 feet above the flood water in the Thedford Flats area.

Summer floods as in the Thedford Flats are lower but equally costly. In June, 1947, water rose to an elevation of 587 feet covering about 900 acres, most of which was in crop.

(c) PORT FRANKS

Port Franks at the mouth of the river, as already stated, now bears the full burden of the waters of the main river as they come through the Canada Company Cut and force a tortuous and ever-changing course through the sand hills of the area. In recent years the damage to property in the village has been excessive, due largely to the severe bank erosion.

The problem of flooding in Port Franks is further accentuated by ice jams at the mouth of the river, which are built up by Lake Huron in the deeply silted sand flats where the river enters the lake.

(d) PARKHILL

Flooding in the town of Parkhill is caused by the waters of a small creek which drains an area of about 2,000 acres above the town. Most of this area is farmland with a few patches of woodland which provides easy run-off from the area. The creek extends three and one-half miles from the town to its source and in that distance the drop is 87 feet or approximately 26 feet per mile. This steep gradient is responsible more than anything else for the rapid accumulation of water in the town.

Bank erosion along Ausable River at Port Franks.

(4) EFFECT OF LAKE HURON WATER LEVELS

The water levels of Lake Huron have varied over the years of record by as much as five feet. These variations in level are not sudden changes as might be caused by winds or seiches but occur irregularly over the years. When considering measures to regulate the flow through the Thedford Flats and the Klondyke area to prevent flooding, because of the flat gradient in the channels and the slight difference in elevation between lake level and the ground elevations in the flats, such measures obviously must be based upon high levels of Lake Huron.

The maximum elevation on record for Lake Huron occurred in 1838 and was 583.78. The maximum monthly mean occurred in July, 1876, and was 582.75. In recent years, however, considerable sand and gravel has been dredged from the foot of the Port Huron Rapids on the St. Clair River just below the outlet of the lake, which has resulted in the lowering of Lake Huron levels by 0.6 feet. The following lake levels may, therefore, be considered as more representative of the conditions as they now exist:

Maximum reading occurred:	July 1, 1929	582.16
Maximum monthly mean:	July, 1929	581.40
Minimum monthly mean:	February, 1934	576.51

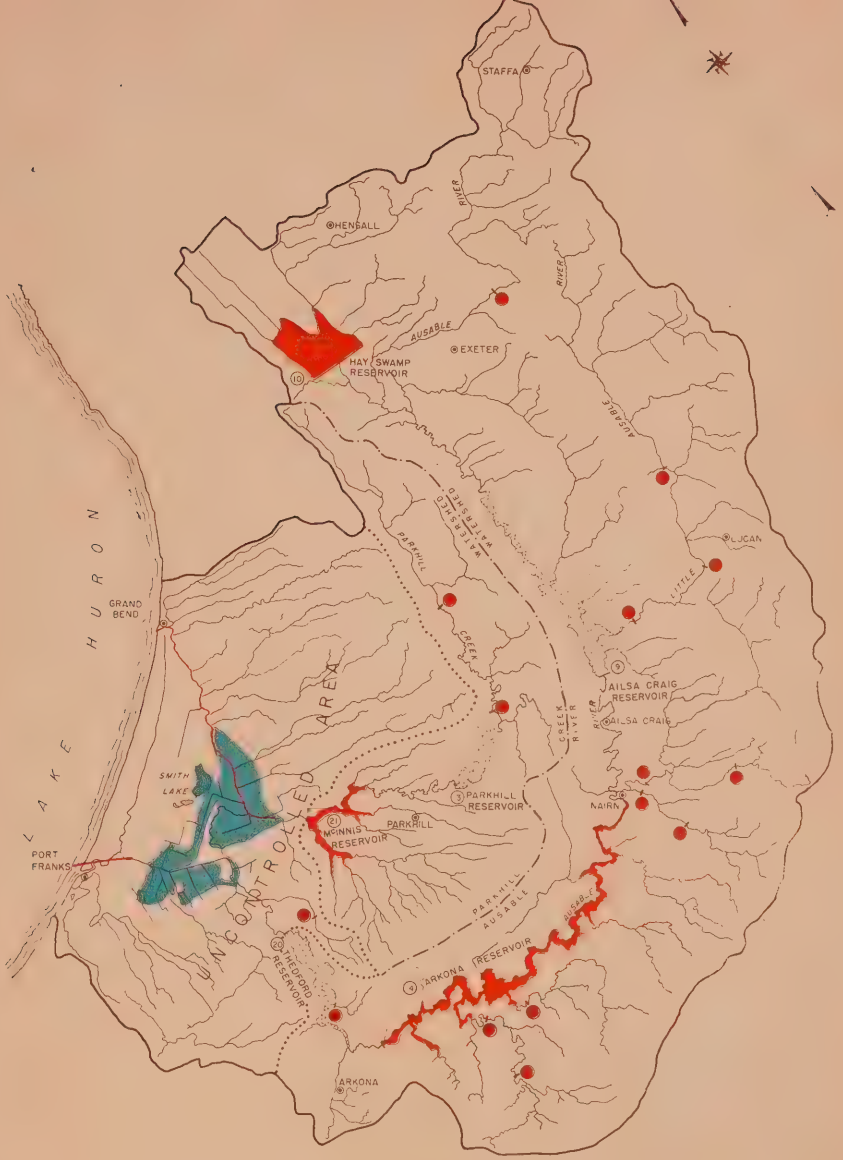
Agencies such as seiches and sustained strong winds may built up higher water elevations.

As seiches are due to a difference in atmospheric pressure on the surface of a large body of water, the water surface elevation in the low pressure area would be higher than that in the high pressure area. Their effect may be a matter of minutes or hours, and their amplitude from a few inches to several feet in some of the larger lakes. A seiche of 2.4 feet has been recorded at the outlet of Lake Huron. The effect of wind action is usually greater, more frequent and of longer duration than seiches. Strong winds may build up the water level two or more feet over a period of several days.

The mean lake levels for the peak days of the spring and summer floods are as follows:

Spring Floods		Summer Floods	
January 6, 1916	578.98	October 7, 1945	579.81
January 31, 1916	578.57	May 26, 1947	579.63
March 29, 1916	578.64	June 8, 1947	579.80
March 24, 1917	579.75	July 28, 1947	580.29
March 8, 1946	579.59		
April 6, 1947	578.42		
March 20, 1948	578.98		

The lowest point recorded on the Thedford Flats is 582.6, which is only 0.44 feet (about half a foot) above the maximum lake level of 582.16, and it is evident that when lake levels are high the channel through the Thedford Flats will be practically full, leaving little room for the flood waters.



AUSABLE WATERSHED

SHOWING

PROPOSED CHANNEL IMPROVEMENT & CONSERVATION RESERVOIRS

LEGEND

PROPOSED MAJOR RESERVOIRS AND CHANNEL IMPROVEMENTS

OTHER POSSIBLE MAJOR RESERVOIRS

POSSIBLE MINOR RESERVOIR DAMSITES NOT EXCEEDING 15 FEET IN HEIGHT

FLOODED AREAS

SCALE — MILES

2 0 2 4 6 8

FIG. H-4

(5) TYPES OF FLOODS

(a) SPRING FLOODS

Spring floods are the most severe as regards volume of water. At this time of the year, the ground is either sealed with frost or saturated with moisture and if the snowfall has been excessive, the volume of water coming down is correspondingly great. However, at this time of the year the lands which are subject to flooding are not in crop; and while water becomes a nuisance and creates hardship in getting about, the entire damage is not so great to crop land as floods which occur during the summer months. Such spring floods, however, always carry a certain amount of silt which represents, for the most part, the top soil of the farmlands farther up the valley. Such floods are usually the cause of damage at Port Franks.

(b) SUMMER FLASH FLOODS

Floods of this type occur periodically during the early spring and summer after the crops have been sown, or later on before they are harvested. They are the result entirely of excessive rainfall over the watershed and in the case of the Ausable, two and one-half inches of continuous rain, depending upon the amount of moisture in the soil, will create a flood condition in the critical lands near the mouth of the river. In fact, the heavy loss of crops at this time of the year is responsible more than any other factor, for the urgency to solve the flood problem on the river.

(c) UNFORESEEN FLOODS

In addition to the recorded spring floods and flash summer floods, there is also a likelihood that greater floods than have ever occurred on the river may occur in the future. In fact, it is common knowledge that damage from flooding of Ontario rivers is becoming more severe as time goes on. Because of this, it is good engineering practice when planning flood control works to anticipate what the greater floods will be, in order to give all possible protection and make such works sufficiently large to take care of floods which may occur once in fifty or better still, once in one hundred years.

In this report, the solution of the flood problem is concerned chiefly with spring and summer floods to the magnitude of those which occurred in 1947, as the cost of providing protection against those which might occur once in a hundred years is too excessive.

2. THE SOLUTION OF THE PROBLEM

In approaching the problem of flood control on any river, certain recognized methods can be employed. These include conservation reservoirs, diversions or canals, channel improvement such as deepening and straightening a river or making a new river course, and the building of dykes. All are costly works and the one which is usually resorted to last is the building of dykes because of their expense which often involves the pumping of water from the protected area back into the channel.

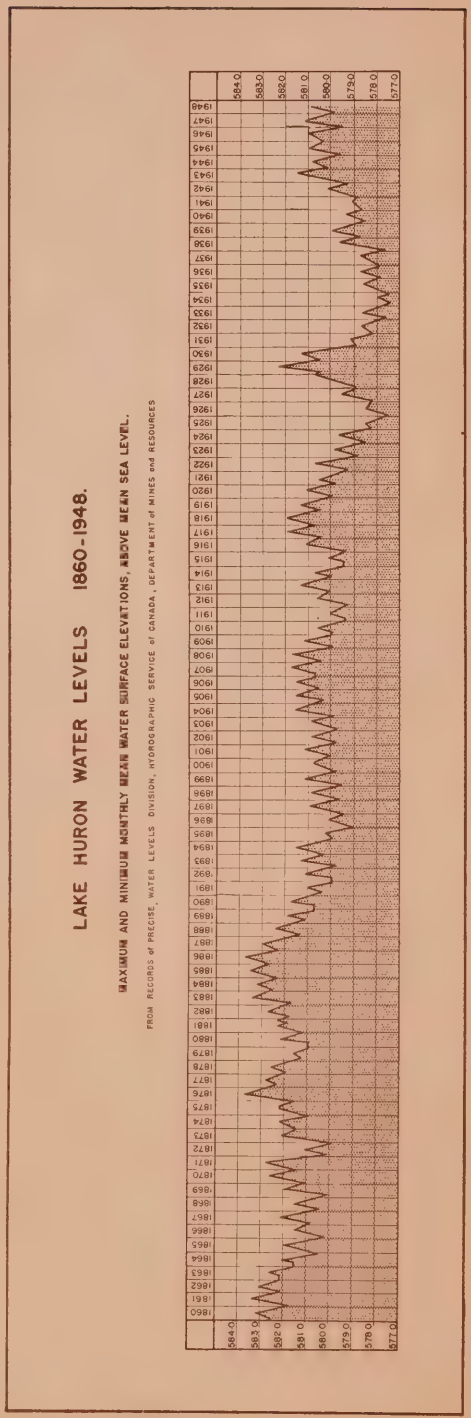
Usually the problem can be solved by reservoirs but where the topography does not provide natural storage areas, other measures mentioned above must be used, and sometimes a combination of two or more and in extreme cases all four.

While usually in engineering reports it is considered sufficient to describe and give costs only of the scheme or schemes which, in the opinion of the engineers are feasible and therefore recommended, in this report it has been considered more satisfactory to describe briefly, with approximate costs, several ways in which flooding may be prevented.

As already mentioned in this chapter, the building of the Canada Company Cut virtually separated the waters of the Ausable into two systems which for the sake of clarity in this section will be referred to as the Main Ausable system and the Parkhill Creek system; and while there is some mingling of the waters of these two systems in the Old Lake Burwell region in periods of severe flooding, the two can be treated separately as far as the hydraulic problem is concerned.

Also by way of introduction it is necessary to explain two terms which will be met with frequently in the discussions which follow. The first of these is the term "acre feet". Liquids in small quanities are usually measured in terms of gallons, but when large quantities of water such as are found in a lake or reservoir, say a mile or more in length, are being considered, the small unit namely a gallon, becomes too cumbersome because of the number of figures involved. Consequently the larger unit, acre feet, is used. This means one foot of water covering one acre in area or its equivalent, regardless of its shape (43,560 cubic feet).

Water which is in motion, such as a stream, or water running through a channel, is measured by the number of cubic feet which pass a given point each second. This is expressed by the abbreviation c.f.s. (cubic feet per second).



As several different schemes and combinations of these are described below for the sake of clarity and reference a summary is stated here.

A—MAIN AUSABLE SYSTEM

1. SUMMER FLOODS OF THE MAGNITUDE OF 1947
   (a) Lesser Port Franks Improvement Channel.
   (b) Arkona Dam (45 feet) and Reservoir.
2. SPRING FLOODS OF THE MAGNITUDE OF 1947
   (a) Greater Port Franks Improvement Channel.
   (b) Arkona Dam (60 feet) and Reservoir combined with Lesser Port Franks Improvement Channel.
   (c) Arkona Dam (68.5 feet) and Reservoir.

B—PARKHILL CREEK SYSTEM

1. SUMMER FLOODS OF THE MAGNITUDE OF 1947
   (a) Lesser Old River Bed Improvement.
   (b) McInnis Dam (26 feet) and Reservoir.
2. SPRING FLOODS OF THE MAGNITUDE OF 1947
   (a) Greater Old River Bed Improvement.
   (b) McInnis Dam (31 feet) and Reservoir and Parkhill Dam (29 feet) and Reservoir combined with Lesser Old River Bed Improvement.
   (c) McInnis Dam (31 feet) and Reservoir and Parkhill Dam (36 feet) and Reservoir.

A—MAIN AUSABLE SYSTEM

1. SUMMER FLOODS OF THE MAGNITUDE OF 1947

At normal Lake Huron levels, floods of this magnitude have a probable occurrence of once in twelve years for the summer months and every year during the spring break-up period. These schemes make no attempt to prevent the latter, although they would be lessened to some extent.

(a) LESSER PORT FRANKS IMPROVEMENT CHANNEL

This scheme provides for an excavated channel about 8,000 feet in length with a 60-foot bottom width, graded to a uniform bottom elevation of 570 feet. Starting from a point on the Canada Company Cut approximately 3,300 feet west of the Blue Water Highway Bridge, it would cut off three loops in the river and enter Lake Huron at a point 2,000 feet northeast of the present river mouth. In order to maintain maximum flow in this new channel it would be necessary to extend the excavation out into the lake and this would have to be protected by

retaining walls or jetties. This channel as described, together with the existing bends in the river which it cuts across, would have an approximate capacity of 6,250 c.f.s. (lake level 580.0 feet) and would be sufficient to prevent floods of this magnitude. It should be noted here that the bends, which are cut by the new channel, will be left open so that part of the flood water will flow around the bends and the remainder through the excavated cut. If the jetties were not built to protect the mouth of the channel, some provision would have to be made for clearing this out periodically by dredging or some other means and would involve an expenditure annually of a few thousand dollars. If this were done then the cost of the jetties, namely $167,396.00, could be deducted from the following estimate and the remaining work would cost approximately $109,000.00. This is essentially the scheme proposed by Col. S. W. Archibald in his report to the Authority dated September 20th, 1948.

Estimated Cost

Breakwater	$167,396.00
Channel Improvement	109,000.00
Total Cost	$276,396.00

(b) ARKONA DAM (45 FEET) AND RESERVOIR

As an alternative method to channel improvement, floods of this magnitude could be regulated by providing a flood storage reservoir equivalent to the increased flow (3,000 c.f.s.) of the above scheme. Seven thousand acre feet storage would be required, which would be available with a 45.0 foot dam and reservoir at Arkona. This dam would be located in the rocky gorge two miles east of the village of Arkona (at road crossing Lot 22, Concessions VII and VIII. Williams W. Township). The reservoir extending easterly for 9.5 miles from the dam and covering an area of 420 acres and would have a maximum depth of 40 feet at the dam.

Estimated Cost $382,500.00

2. SPRING FLOODS OF THE MAGNITUDE OF 1947

The 1947 spring flood had a peak flow of 10,800 c.f.s. at Port Franks. Floods of this magnitude have a probable occurrence of once in six years for the spring months and protection for these may be obtained as follows:

(a) GREATER PORT FRANKS IMPROVEMENT CHANNEL

To provide the required protection by this means it would be necessary to increase the channel capacity from 3,000 c.f.s. to 7,550 c.f.s. for the cut described under 1 (a) (Archibald's). In order to obtain this discharge of 7,550 c.f.s. the channel would have to be enlarged to a bottom width of 180 feet and graded to a bottom elevation of 570.0 feet throughout its length. With this enlarged section, the channel plus the existing river loops would protect the Thedford Flats and Port Franks from flows up to 10,800 c.f.s. at lake levels up to and including 580.0 feet. With flows of this magnitude, jetties would have to be built.

Estimated Cost $763,248.00

(b) ARKONA DAM (60 FEET) AND RESERVOIR COMBINED WITH THE LESSER PORT FRANKS IMPROVEMENT CHANNEL

The lesser Port Franks Improvement Channel (Archibald's) would provide a total channel capacity flow of 6,250 c.f.s. and to keep the spring flood flow at Port Franks down to this level it is estimated that 20,000 acre feet of storage are required. Such storage could be had at several sites along the river, of which the Arkona site is believed to be the most suitable. A dam 60.0 feet high at this site, with a maximum water depth of 54.0 feet would provide the required storage. This would be an earth-filled controlled dam with a concrete spillway section and would be located in the rocky gorge about two miles east of the village of Arkona at the same location as described for 1 (b). From the proposed dam the reservoir extends easterly and when full would be approximately 14 miles long with a surface area of 1,060 acres.

Estimated Cost	
Arkona Dam (60 feet) and Reservoir	$723,058.00
Lesser Port Franks Improvement Channel	276,396.00
Total Cost	$999,454.00

(c) ARKONA DAM (68.5 FEET) AND RESERVOIR

To reduce the peak spring flow at Port Franks to the present channel capacity (3,250 c.f.s.) by means of storage only, would require a reservoir to impound 35,000 acre feet of water. This amount of storage could be had with a 68.5 foot dam at Arkona, located at the same site as above but the reservoir, when full, would extend easterly for 16 miles and have a surface area of 1,850 acres with an average width of 0.2 miles (1,056 feet).

Estimated Cost.....$1,010,624.00

B—PARKHILL CREEK SYSTEM

Means of regulating flood flows in this area would be the same as those employed on the Ausable River, namely by reservoirs and channel improvement. The flooding here is more extensive than on the Ausable and will be more difficult to handle owing to the large uncontrolled portion of the watershed (approximately 50%) being situated below the trouble area but which contributes to the flooding of the latter and also because of the lack of suitable storage above. From Figure H-4 it will be noted that there are six creeks emptying into the Old Ausable River channel between its confluence with Parkhill Creek and Grand Bend. These streams have an average gradient of 17.5 feet per mile giving rise to a very heavy run-off which soon fills the channel to, and often beyond, its capacity. With the lower part of the channel full, the flow from the upstream areas is seriously hampered and the water is backed up onto the low-lands in the vicinity of Devil's Elbow. This old channel was improved in 1929 from above the tri-county bridge to Grand Bend, a total distance of 9.5 miles, at a total cost of $91,010.00. During the twenty years since this improvement, the channel has been silted up considerably and in places overgrown with brush. The actual capacity of the channel has thereby been considerably reduced.

Mosaic from aerial photographs showing the proposed channel improvements. Old Ausable River courses and the lower part of the "Cut" may also be seen.

The mouth of the Ausable River.

Thus it would seem logical to provide increased flow in the lower part of the Old Ausable River channel and to build dams and reservoirs above to regulate the flow into this part of the Parkhill Creek system and prevent flooding of the lowland.

1. SUMMER FLOODS OF THE MAGNITUDE OF 1947

Floods of this magnitude have a probable frequency of once in 12 years for the summer months and every year for the spring months at normal lake level. The capacity of the Old Ausable River channel at Grand Bend is estimated to be 1,200 c.f.s. The peak flow of the 1947 summer flood was approximately 2,470 c.f.s. Therefore to prevent summer floods of this magnitude it will be necessary to (a) increase the present channel capacity from 1,200 c.f.s. to 2,470 c.f.s. or (b) provide a reservoir upstream to reduce the peak flood flow from 2,470 c.f.s. to 1,200 c.f.s.

(a) LESSER OLD RIVER BED IMPROVEMENT

This plan would provide for an improved channel from Grand Bend to a point on Parkhill Creek 1.2 miles above its confluence with the Old Ausable River at Devil's Elbow, an overall distance of 9.65 miles. The Channel would be dredged and widened uniformly from a 27 foot bottom width at the upper end to a 70 foot bottom width at Grand Bend. Designed to carry 10 feet of water throughout, the channel would have a uniform slope of .014 per cent, and at a lake level of 580.0 it would safely discharge flows of the 1947 summer flood magnitude. Assuming that the excavated material may be disposed of along the banks, the estimated cost would be:

Estimated Cost..... $267,501.00

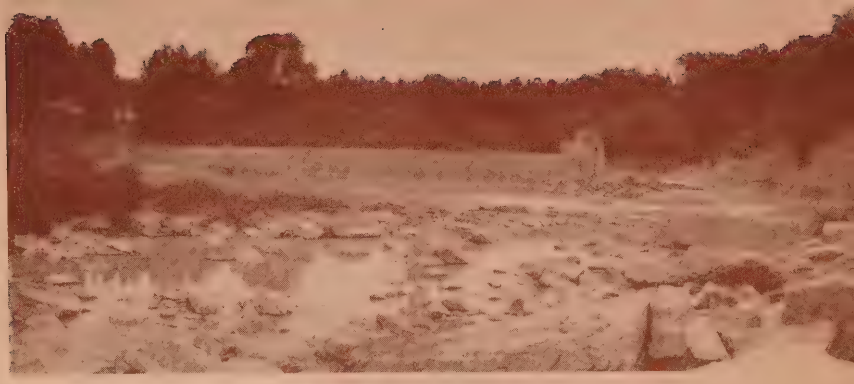
(b) McINNIS DAM (26 FEET) AND RESERVOIR

To reduce the peak summer flow of 2,470 c.f.s. to the present channel capacity of the old river bed would require approximately 4,000 acre feet of storage. This amount of storage is available at several points along the upper part of the creek, but the McInnis site being closest to the flood problem would be the most suitable one. The dam for this reservoir would be located about 1.5 miles southwest of McInnis just east of the road between Lots 20/21, Concession VI of McGillivray Township. At full capacity, the reservoir would have 21 feet of water at the dam and would extend back 3.0 miles on the north arm and 1.8 miles on the south arm, with a total surface area of 540 acres. This would be an earth-filled controlled dam with a concrete spillway section capable of discharging 5,190 c.f.s.

Estimated Cost..... $227,638.00

2. SPRING FLOODS OF THE MAGNITUDE OF 1947

The 1947 spring flood had an estimated peak flow of 4,650 c.f.s. Flows of this magnitude might be expected once in 12 years for the spring months. Such floods could be controlled as follows:



Old Arkona Power dam.

Ausable River gorge at proposed Arkona Damsite.

Earthen dam with planked spillway near Denfield.

Bell sawmill dam near Hensall.

(a) GREATER OLD RIVER BED IMPROVEMENT

To confine flows of this magnitude by this means it would be necessary to widen and dredge the present channel from Grand Bend to a point on Parkhill Creek 1.2 miles above its confluence with the Old Ausable River at Devil's Elbow, a distance of 9.65 miles. In addition, the section from the head of the channel improvement up to the road between Lots 20 and 21, Concession VI, McGillivray Township, would be cleaned out to give the flood waters a free entry into the new channel section. The channel would have a 43-foot bottom width at the upper end, increasing gradually to a 98-foot bottom at Grand Bend. Graded from an elevation of 568 feet at the lake to elevation 577.5 feet at the head, the channel would have a uniform slope of .014 feet per hundred and when full would have a maximum water depth of 12 feet throughout. At a lake level of 580.0 the channel would discharge 4,670 c.f.s. at approximately 3.5 feet per second.

Estimated Cost $791,632.00

(b) McINNIS DAM (31 FEET) AND PARKHILL DAM (29 FEET) COMBINED WITH LESSER OLD RIVER BED IMPROVEMENT

The Lesser Old River Bed Improvement provides for a channel flow of 2,470 c.f.s. at Grand Bend or about 53 per cent of the flow experienced in the 1947 spring flood. To regulate this balance of flow it would be necessary to reduce the flow at McInnis to 500 c.f.s., which would require approximately an additional 12,000 acre feet of storage. This extra amount of storage would be provided by increasing the twenty-six foot dam at McInnis to thirty-one feet and building an additional dam and reservoir above the village of Parkhill. The McInnis dam would be in the same location as described in Scheme 1 (a) above, but with this higher dam the reservoir would have an area of 1,245 acres as compared to the 540 acres for the lower dam. The Parkhill dam would be located about three-quarters of a mile north of the Town of Parkhill, on Lot 5, Concession V, McGillivray Township, just east of No. 81 Highway. When full, the reservoir would have a maximum depth of 24.0 feet at the dam and would extend easterly for a distance of 2.5 miles with a surface area of 195 acres.

	Estimated Cost
Lesser Old River Bed Improvement	$267,501.00
McInnis Reservoir (31.0 dam—9,000 acre feet)	356,767.00
Parkhill Reservoir (29.0 dam—3,000 acre feet)	260,000.00
Total Cost	$884,268.00

(c) McINNIS DAM (31 FEET) AND PARKHILL DAM (36 FEET)

As an alternative to the two schemes outlined above, such floods may be controlled by means of storage reservoirs alone. This would require 15,300 acre feet of storage. This would be provided by a thirty-one foot dam at McInnis (same as 2 (b) above) and by increasing the Parkhill dam from 29 feet to 36 feet. The McInnis reservoir would provide 9,000 acre feet of storage and the Parkhill 6,300 acre feet. The larger Parkhill dam would have a maximum water depth of 31 feet and the reservoir would be 4.5 miles long with a water surface area of 270 acres. The McInnis and Parkhill dam sites would be located as they are outlined for Scheme 2 (b) above.

	Estimated Cost
McInnis Reservoir (31.0 dam—9,000 acre feet)..	$356,767.00
Parkhill Reservoir (36.0 dam—6,300 acre feet)..	402,126.00
Total Cost.....	$758,893.00

3. SUMMER FLOW

(1) GENERAL

While the control of flood waters on any river is superficially the most urgent problem to be solved, nevertheless, the desirability of increasing summer flow is also important. More water in a river in the summer is an asset to agriculture, provides a means of flushing out the channel and is necessary for the presence of fish life.

For summer flow the reservoirs are not necessarily as large as those for flood storage, but to obtain a reasonable amount of flow their number would have to be increased. Moreover, the presence of many smaller reservoirs on a watershed adds to the recreational value of the area, provides habitat for fish and where the soil is porous, allows for deep seepage into the underlying water table for use of farm wells.

When considering the needs of water conservation on the Ausable Watershed, consideration was given to the possibility of providing increased summer flow, and for this purpose a number of small reservoirs were indicated. The construction of all these reservoirs, at the present time, is not feasible because of the cost, but are set down to indicate where such storage may be found if and when a more complete hydraulic solution for water conservation is desired on the watershed.

The most strategic part of a watershed, where summer flow reservoirs are most desirable, is of course at or near the headwaters of a river system. Such storage can be found on the Ausable in Hay Swamp, where a reservoir can be built at low cost, which will provide an appreciable amount of summer flow.

(2) HAY SWAMP RESERVOIR

An earth and concrete controlled dam 13.0 feet high located along the road between Lots 5 and 6, Concessions IV to VIII, Hay Township, would provide 10,400 acre feet of storage. The reservoir would have a water surface area of 2,700 acres when full, with a maximum depth of 10 feet at the dam. Most of the area is swamp and willow-scrub bush with some poor pasture, and attempts to improve this land by means of drains have failed.

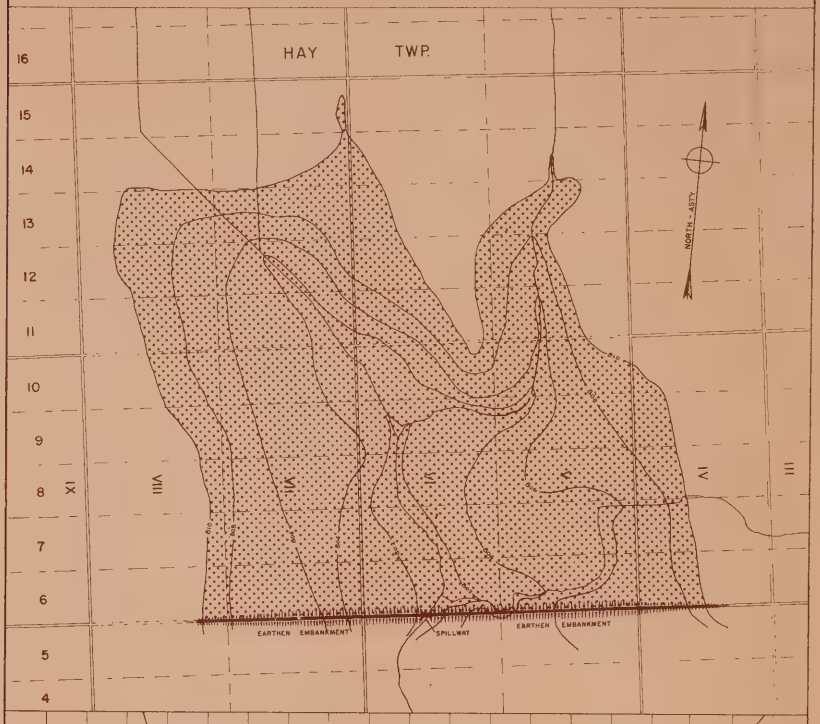
Assuming that the summer rains will replace the water lost through evaporation and deep-seepage, this reservoir would supply a continuous flow of 41 c.f.s. throughout the period May 15th to September 15th (123 days).

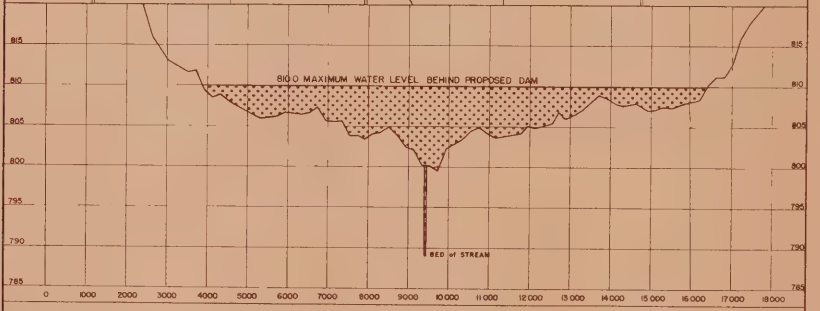
The estimated cost of the dam and reservoir, including a 14-foot roadbed along the top of the dam is $200,000 or approximately $19.25 per acre foot of storage.

PLAN OF PROPOSED HAY SWAMP RESERVOIR

SCALE IN FEET

1000 0 1000 2000 3000 5000





PROFILE OF PROPOSED DAMLINE - THE ROAD BETWEEN LOTS 5 & 6, CONS. IV-VIII, TWP. OF HAY

SCALES IN FEET

HORIZONTAL 1000 0 1000 2000 3000 5000

VERTICAL 5 0 5 10 15 25

PLAN AND PROFILE OF PROPOSED HAY SWAMP RESERVOIR

LYING IN LOTS 6-15, CONS. IV-VIII, TWP. OF HAY, HURON COUNTY.

RESERVOIR AREA

SCALES - AS SHOWN

ELEVATIONS ABOVE MEAN SEA LEVEL, G.S.C.

FIG. H-5

3. DRAINAGE

It has always been assumed that the results of drainage are beneficial and that all properties affected by any drainage scheme are benefitted in a greater or smaller degree. All drainage legislation to date has been based on this assumption and has resulted in many drainage schemes being extended, not only beyond the bounds of economic feasibility, but even beyond the limits of physical practicability.

The result is that, in many cases, drains have been pushed into areas where they not only do not serve the purpose for which they were intended but actually are a detriment to the welfare of the community by draining water out of natural water storage areas such as swamps and bogs without creating soil conditions dry enough for cultivation or even the maintenance of worth-while pasture.

This drainage of swamps and bogs means that the water is not available to maintain adequate summer flow in the streams and has also lowered the water table to such a point that wells have gone dry as a direct result of draining.

No drainage scheme should be undertaken without due consideration of all the physiographic and economic features. The Kennedy Report makes the following recommendations:

(a) that no drainage project be undertaken until its probable effect upon the community as a whole has been considered by a board of referees, composed of judicial and engineering personnel, as well as practical farmers, and the approval of such board obtained.

(b) that no single landowner or small group of owners may be enabled to force an unwanted and even detrimental drainage scheme on neighbouring owners without their consultation and consent.

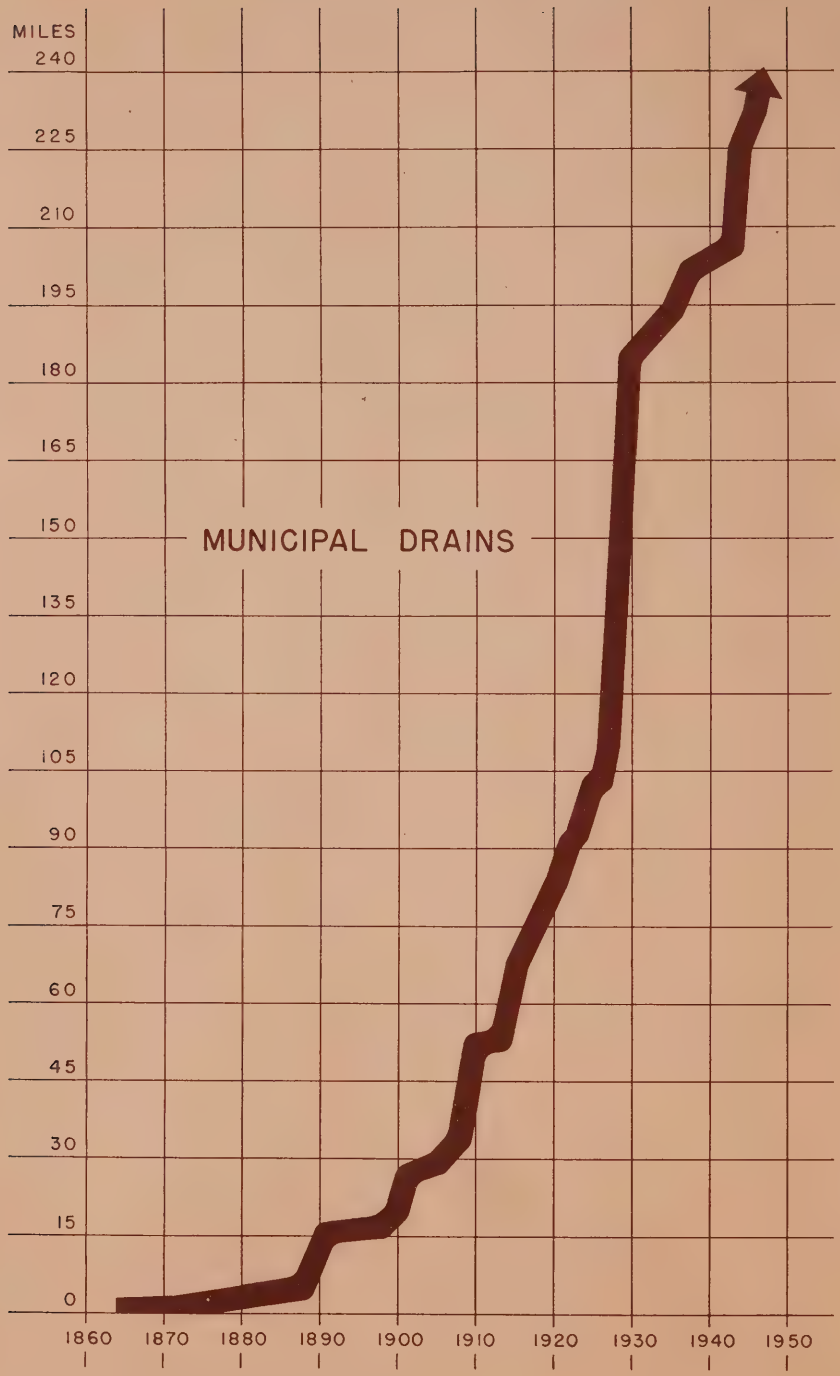
(c) that the cost of the work will be equitably distributed among the landowners actually benefitted.

(d) that provision be made for payment of compensation to those injuriously affected, and

(e) that Municipalities have power to expropriate areas which it is proposed to drain, when the welfare of the community requires that the area in question should be maintained in its existing state.

Every Conservation Authority should investigate any drainage scheme which is proposed within its boundaries, and have a representative present at the presentation of the engineer's report as provided by Section 2 (11a), *The Municipal Drainage Act*, amended 1949.

A total of 243.43 miles of drains have been constructed on the Ausable Watershed and at least $600,000 has been spent on the work. The cost of maintenance work is continually rising; one drain five miles long in Hay Township cost $3,502 to construct in 1910; in 1930 it cost $6,539 to clean out; and 14 years later cost another $4,732. Some drains on the watershed, including river channel improvements, have cost as much as $10,000 per mile.


MILES
240
225
210
195
180
165
150
135
120
105
90
75
60
45
30
15
0
MUNICIPAL DRAINS
1860
1870
1880
1890
1900
1910
1920
1930
1940
1950

PART V—WILDLIFE

1. INTRODUCTION

There are two objectives in planning for wildlife. One of these is to retain for the average citizen the opportunity to hunt and fish, within the law, in an attractive environment, and where possible to trap fur for profit. The ability of any piece of land or water to produce an annual yield of game mammals, game birds, fur and fish is a significant part of its capital value. The second objective is to retain for the average citizen the opportunity to see and enjoy the varied forms of birds, mammals and other wildlife native to the region concerned, in the greatest possible variety. These animal populations should be adapted so that they have no adverse effect on any reasonable farming practices. Management of wildlife is thus a normal branch of good land management.

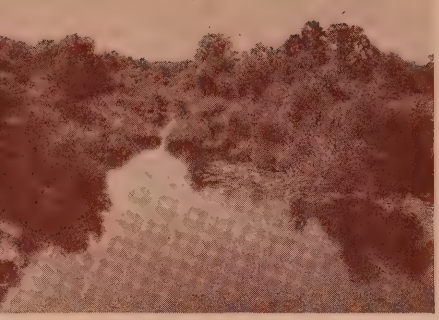
2. STATUS OF PRESENT SPECIES

In the Ausable Watershed, the amount of good habitat available appears to be the controlling factor in the abundance of wildlife. The country probably supported a maximum of game and the larger forms of wildlife some twenty years after the land was first settled. The populations were gradually reduced as the land became cleared. Many species such as the beaver and porcupine no longer occur in the watershed. Others like the passenger pigeon are now extinct. Quail, once abundant, are now very scarce. A few deer remain. They were once so common that at Strathroy, just off the watershed, they were "piled up like cordwood, and you could take your choice at a dollar each." Several open country species such as the red fox, the skunk and the cottontail have increased since settlement. Apart from migratory waterfowl the only game species now commonly hunted in the watershed are the jackrabbit and the cottontail. The watershed, however, includes in Smith Lake one of the best duck marshes in Southern Ontario.

The wildlife section of the report includes complete lists of the former and present mammals known in the watershed and of the summer birds found in the area.

3. IMPROVING THE FARM FOR WILDLIFE

There are several simple practices which any farmer in the watershed may use to attract wildlife to his property. The elimination of grazing of woodlots would be the most useful single measure in improving the wildlife environment. While reforestation is useful up to a point it should be remembered that large blocks of spruce and pine are quite sterile as far as game is concerned. Release cuttings, slashings to stimulate sprout growth, thinnings and felling timber for sale will all improve the carrying power for wildlife of dense woodlots. Those who are interested in wildlife improvement will find that the inclusion of a few field boundary hedges on the farm will moderate the effect of winds on the crops, serve as travel lanes and cover for wildlife, and harbor large numbers of songbirds which help to control insect pests. Rosa multiflora is an excellent hedge forming shrub, and is hardy at least in the parts of the watershed facing Lake Huron. It does not exhaust the nearby cultivated ground and provides excellent cover and food.



Much of the upper course of the main Ausable provides good muskrat habitat, but cattails are too scarce and winter food is limited.

The Old Ausable in the Pinery. Overtrapping has reduced the muskrats almost to extinction where they were once abundant.

Smith Lake would be a paradise for muskrats, but is periodically flooded and overtrapped.

The lagoons at Port Franks are also overtrapped and severely flooded every spring.

Ringnecked pheasants cannot normally overwinter in the watershed without artificial feeding. Yellow corn, buckwheat and Japanese millet are recommended for wildlife food plots.

4. MUSKRATS

The records of former years indicate that the streams of the watershed could support a much higher population of muskrats than the present one. There has been a serious and almost continuous decline in the population, speeded up, in the two years prior to the survey, by heavy trapping caused by the high price of the pelt. The chief reasons offered for the decline have been extensive overtrapping and illegal trapping and the rigid fixing of the trapping dates in advance of the actual season. The general opinion of trappers in 1948 was that there would be considerable improvement in the situation if there was a closed season for one year to establish a plentiful supply of muskrats in the river, and that the season should be opened by an overseer or local authority at the spring break-up, not before, and rapidly closed when it is clear that the spring run is over or when a high percentage of females begins to be taken. Assuming that strict enforcement of the law is a possibility, the establishment of small reservations or restricted areas where muskrats could breed unmolested and from which they would spread in the spring and fall dispersal is generally favoured.

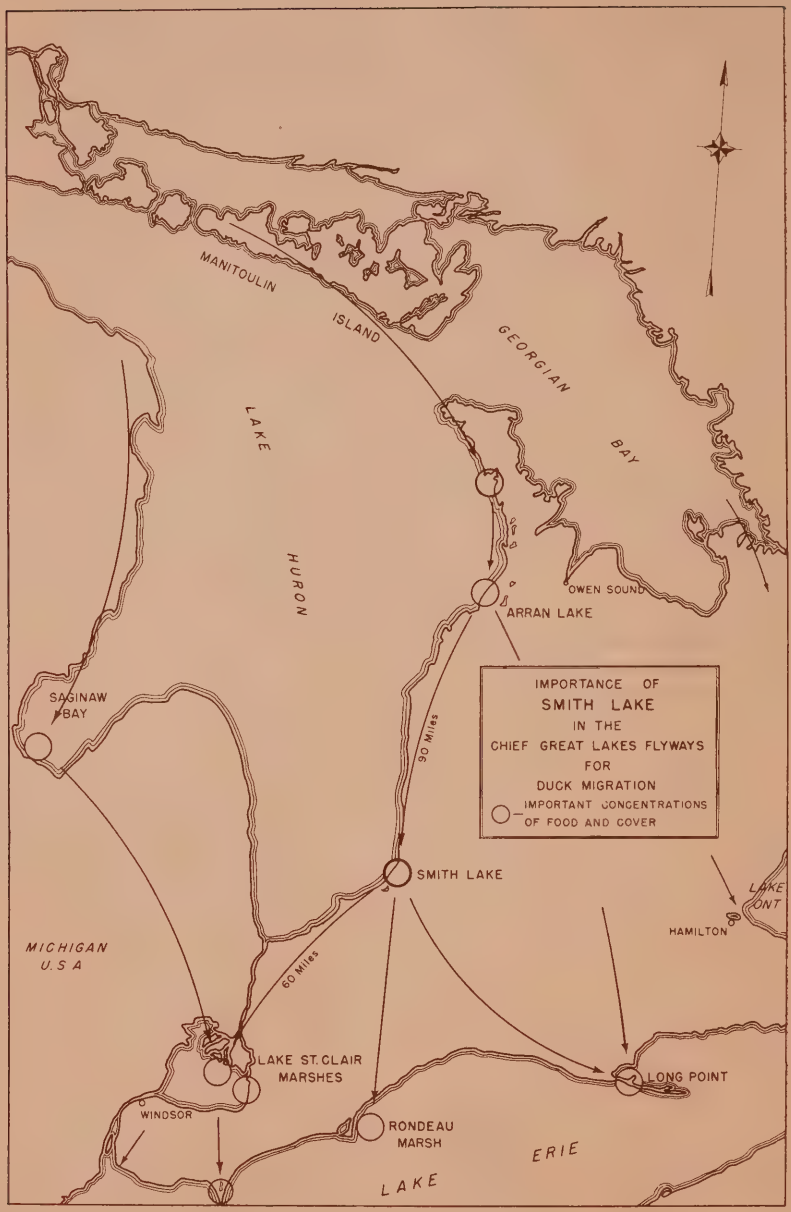
5. MEADOW MICE

Large areas of the Ausable Watershed are recommended for reforestation. In many parts of the United States and Canada meadow mice have caused severe damage to young trees in reforestation projects and nurseries. There was severe damage to reforestation on the Haig farm near Grand Bend in 1935. In the winter of 1947-8 on a farm near Exeter, Huron County, 95% of the trees in a plantation of 25 acres were girdled and killed in a few weeks by meadow mice. It is therefore clear that they could radically affect reforestation of the watershed. The mice were scarce in most parts of the watershed in 1947.

Control measures involve both protection of the trees by repellents or cultivation methods, and reduction of the population by predators, poisoned baits or trapping. The simplest and cheapest aid to the control of mouse populations is without doubt the protection of those predators which live chiefly or largely on mice, such as most of the hawks, all the common owls, foxes and snakes. Those who acquire land and plant trees in or near dense grasses or sedge vegetation and then proceed to destroy the natural mouse predators may expect to lose part or all of their plantations to this cause. Five of the Source Areas listed for reforestation in the Forestry Section of the report were classified, after careful examination, as very vulnerable to attacks from meadow mice.

6. SMITH LAKE

Smith Lake, a one-thousand acre remnant of a former extensive lake and marsh area, lies in an important section of the Great Lakes bird migration flyway. It is the only marsh providing excellent cover and food for large numbers of wildfowl in the 150 miles of flyway between the Port Elgin-Arran Lake marshes in Bruce County and the Walpole Island marshes on Lake St. Clair. As many as 10,000 ducks at a time formerly used the marsh, and thousands still come in.


MANITOULIN
ISLAND
GEORGIAN
BAY
LAKE
HURON
OWEN SOUND
ARRAN LAKE
SAGINAW
BAY
90 Miles
IMPORTANCE OF
SMITH LAKE
IN THE
CHIEF GREAT LAKES FLYWAYS
FOR
DUCK MIGRATION
IMPORTANT CONCENTRATIONS
OF FOOD AND COVER
SMITH LAKE
LAKE
ONT
HAMILTON
MICHIGAN
U.S.A
60 Miles
LAKE ST. CLAIR
MARSHES
LONG POINT
WINDSOR
RONDEAU
MARSH
ERIE
LAKE

There is nearby alternative cover, and Lake Huron is only a mile away. The importance of the marsh is therefore out of all proportion to its size. It is doubtful whether an area so strategic should remain in private hands, as it is by no means certain that any future owner would appreciate the importance of the marsh to wildlife. Inroads into the marsh for increasing the cultivated area are still being made.

It is recommended that all large and strategically placed wildfowl marshes which are now threatened, as Smith Lake is, should be examined by both the Provincial and Dominion Wildlife Services with a view to strong action to safeguard their future.

7. FISH

The waters of the drainage basin were classified as to their suitability for fish. The classification was based on collections of the fish and aquatic insects at more than 200 stations. The aquatic insects were used because many of the species are reliable indicators of the stream conditions at the critical time of year. From the point of view of fish management the permanence of flow and the maximum summer temperature are frequently the critical factors in streams of Southern Ontario.

The survey of the Ausable River showed first, that most of the tributaries are dry or merely a succession of standing pools in summer, and second, that very little of the water is cool enough to support the finer game fish such as brown trout and speckled trout. Cool springs providing possible trout water were found in the following areas: (1) In the region of Staffa; (2) In the Hay Swamp; (3) Near the mouth of the Little Ausable; (4) On Nairn Creek; and (5) In three tributaries flowing into the Arkona gorge.

Because of its low flow in dry summers and the drying up of most tributaries, the Ausable in its present condition has little to recommend it as a fishing stream. The low water levels reduce both the cover for fish and fish food. During the survey speckled trout were recorded only in the Denfield branch of Nairn Creek, which is well suited to the species. Most of the remaining cool tributaries are so small that they would not produce or sustain many trout unless trout ponds were created near their sources.

Although the river is polluted near Exeter by the effluent from a canning factory and also at Parkhill, measurements of oxygen per cent saturation of the water at these places indicated that the pollution was nowhere seriously affecting fish life.

The bass family is represented in the river by the large-mouth, small-mouth and rock bass, and by three species of sunfish, one of which, the bluegill, is common in the old river channel in the Pinery; but in general bass are scarce in the watershed. Large-mouth and small-mouth bass occur at intervals in the main channel from above Exeter to the river mouth and also in the Little Ausable. Rock bass were taken in Mud Creek above Parkhill. Pike are quite common. The maskinonge has been reported from the lower canal section. A total of thirty-six species of fish are listed in the report as occurring in the watershed.

STREAM COLLECTION STATIONS

LEGEND

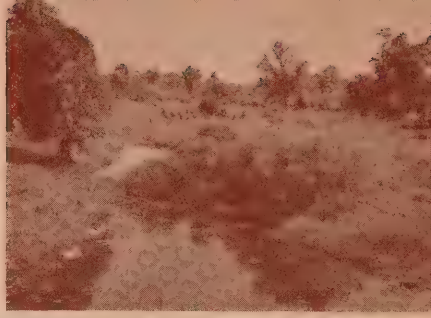
STREAM COLLECTION STATIONS ---------- •

CONTOURS ---------- —700—

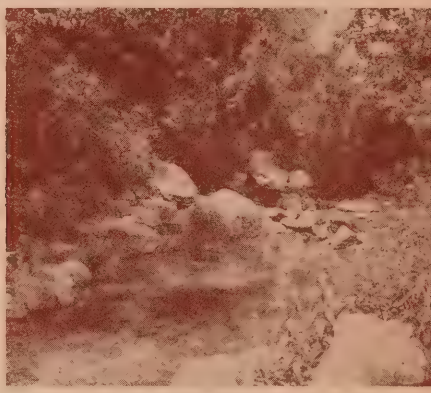
THEDFORD MARSH AREA ---------- ▭

SCALE: MILES

0 1 2 3 4 5



Catfish and pike are the common fish where the river dries to standing pools in the summer. This is the Little Ausable near Clandeboye.



Permanent tributaries from cold springs are not common in the watershed. This is a trout stream above Rock Glen, near Arkona.

The main Ausable River in the Arkona Gorge is rapid and shallow, but provides some shelter for bass.

One of the lagoons south of Port Franks. The chief species here are bluegills and pike.

A side-road in Stephen Township marred by thoughtless dumping of refuse.

This attractive picnic site on the upper Ausable is recommended for acquisition.

Another part of the same picnic site as above. The location is part of Lot 6, Concessions X and XI, McGillivray Township.

The watershed has remarkably few lakes and ponds. Apart from Smith Lake and the lagoons south of Port Franks there are no water surfaces larger than three acres. The report includes recommendations for the construction and treatment of both warm and cold farm fish ponds. There are also recommendations for modifying the stream conditions for fish at various points, particularly by planting alders along the banks. If the Hay Swamp dam proposed in the Hydraulics section of this summary were constructed, the reservoir would increase the sections of the river now available to bass. There would be more cover in the form of deeper pools for the larger fish. At the same time the long term end should also be kept in view, of increasing the sections of the river suitable to speckled and brown trout.

RECREATION

1. GENERAL CONSIDERATIONS

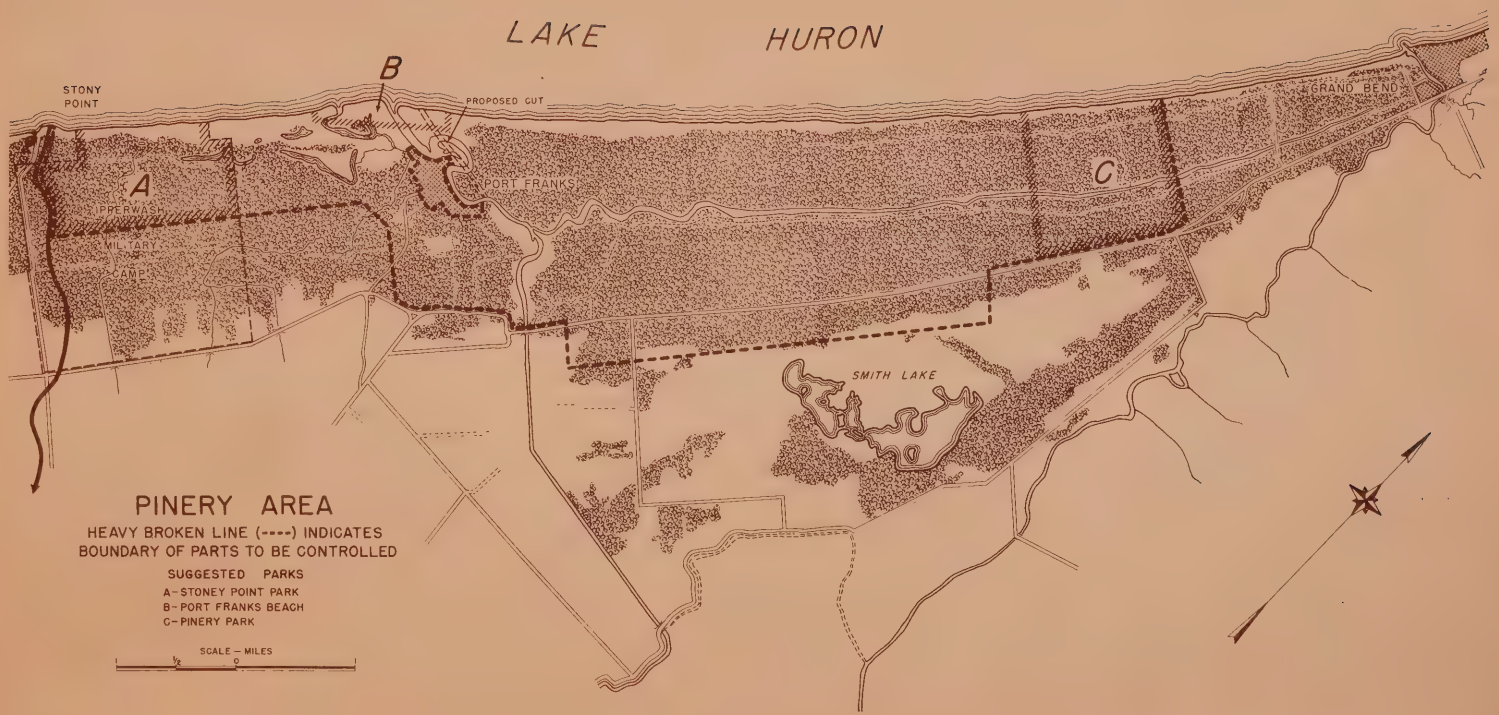
Catering to those interested in recreation is already one of the most important occupations in the Ausable Watershed. The capital invested in it is very great and every sign indicates a rapid future growth. However, this report is not concerned primarily with the tourist industry, but rather with the needs of all those living in the watershed. The purpose of the survey was to recommend the improvement of existing public recreation areas, and the acquisition or control of areas which are needed for public use, but which are threatened by private interests. Three objects were kept in view during the survey. These were to retain and protect the natural advantages; to develop adequate facilities in maximum variety available to all people whatever their age, occupation or income might be; and to adjust any plans to other conservation measures which might be recommended to the Ausable Conservation Authority.

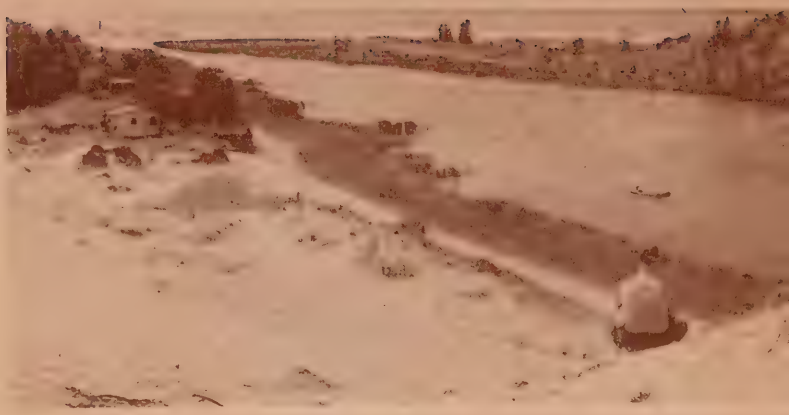
Fourteen types of recreation facility are listed in the report. Of these, beaches and picnic sites are the most popular. While some facilities, such as roadside tables, are best supplied separately for individual families, many others may be combined in one large multiple use area. All such facilities, large or small, should be integrated in a broad plan of land use in which healthy recreation is included.

2. RECREATION FACILITIES IN THE AUSABLE WATERSHED

Most of the watershed is rolling farmland with many shallow valleys. While such land provides some hunting areas and a few attractive picnic sites it is quite overshadowed by the Lake Huron shore and the Pinery, with its magnificent fourteen miles of sand beach and the lagoons of the Old Ausable. This shore is destined to be one of the more important recreation areas of Southern Ontario if its advantages are maintained.

Two other areas are of interest in the watershed. One of these is the Ausable Gorge near Arkona, which is naturally park-like, and whose fossil-laden rock formations have made it known throughout North America. Much of the gorge is ideal for parks or picnic sites. The other interesting area is Smith Lake, a privately owned large wildfowl marsh, having a great variety of interesting birds and plants. This area is of interest only to a limited number of people.


LAKE HURON
B
STONY POINT
PROPOSED CUT
GRAND BEND
A
PREVIOUS MILITARY CAMP
PORT FRANKS
C
SMITH LAKE
PINERY AREA
HEAVY BROKEN LINE (----) INDICATES BOUNDARY OF PARTS TO BE CONTROLLED
SUGGESTED PARKS
A-STONEY POINT PARK
B-PORT FRANKS BEACH
C-PINERY PARK
SCALE - MILES
½
0



The mouth of Mud Creek, near Port Franks. This area is beginning to be built up. The beach is always crowded on fine weekends.

Behind the sand dunes, south of Port Franks lie clear lagoons and unspoiled woods.

This lake lies in the former Ipperwash Military Camp, recommended for acquisition for the public.

The use of Lake Huron beaches has grown very rapidly in the last ten years. The use of the watershed for recreation may be expected also to grow rapidly in the future. The most pressing need is to acquire small strips of land fronting on the beaches so that the public will have access to the beach. It is not too late to do this in the Ausable Watershed.

3. PRESENT FACILITIES

Grand Bend, the chief summer resort area today, was a former fishing port, and already had a few summer visitors in the 1890's. Its summer population now exceeds 4,000. However, the beach, its main attraction, is comparatively undeveloped. No public playground is available other than the fine beach and a softball diamond. While 5,000 persons may line the beach at Grand Bend, there were at the time of the survey no public picnic tables or shade trees and no public lavatories. Many residents of the watershed prefer the quieter beaches which, while privately owned, are open to the public. Nevertheless, Grand Bend continues to grow in popularity.

Almost all of the land in the Village of Port Franks is now privately owned, and although boating, fishing and riding are available, the chief recreation fa 'ity of the area is the Lake Huron beach.

The shore of Lake Huron includes fourteen miles of beach within the official boundary of the Ausable Watershed. Most of this beach is of fine, clean sand and the water is safe for bathing. Though there is a substantial strip which is open to the public, there is no guarantee of access to it by car, and almost all of the shore lots are privately owned.

The Pinery is described in detail in the Forestry section of this summary. Its beautiful beach, its unusual flora and fauna make it one of the most interesting and attractive natural parkland areas in Southern Ontario. A few commercial camp sites, tourist cabins and picnic tables dot the area, and there is one golf course at Grand Bend. The spectacular Arkona Gorge is a popular spot for picnics and sightseeing, because of the picturesque rock glen and falls. Unfortunately, this spot is open to casual visitors only through the courtesy of the property owner, and at any time it might be closed to the public.

Outside the areas just described, the watershed is now little used for recreation away from home, except for parks within the boundaries of towns and villages. It may be supposed that the residents, who are mostly engaged in agricultural work, are not much interested in rural picnic areas, but many of those interviewed expressed a particular interest in the retaining of a few parks and picnic sites.

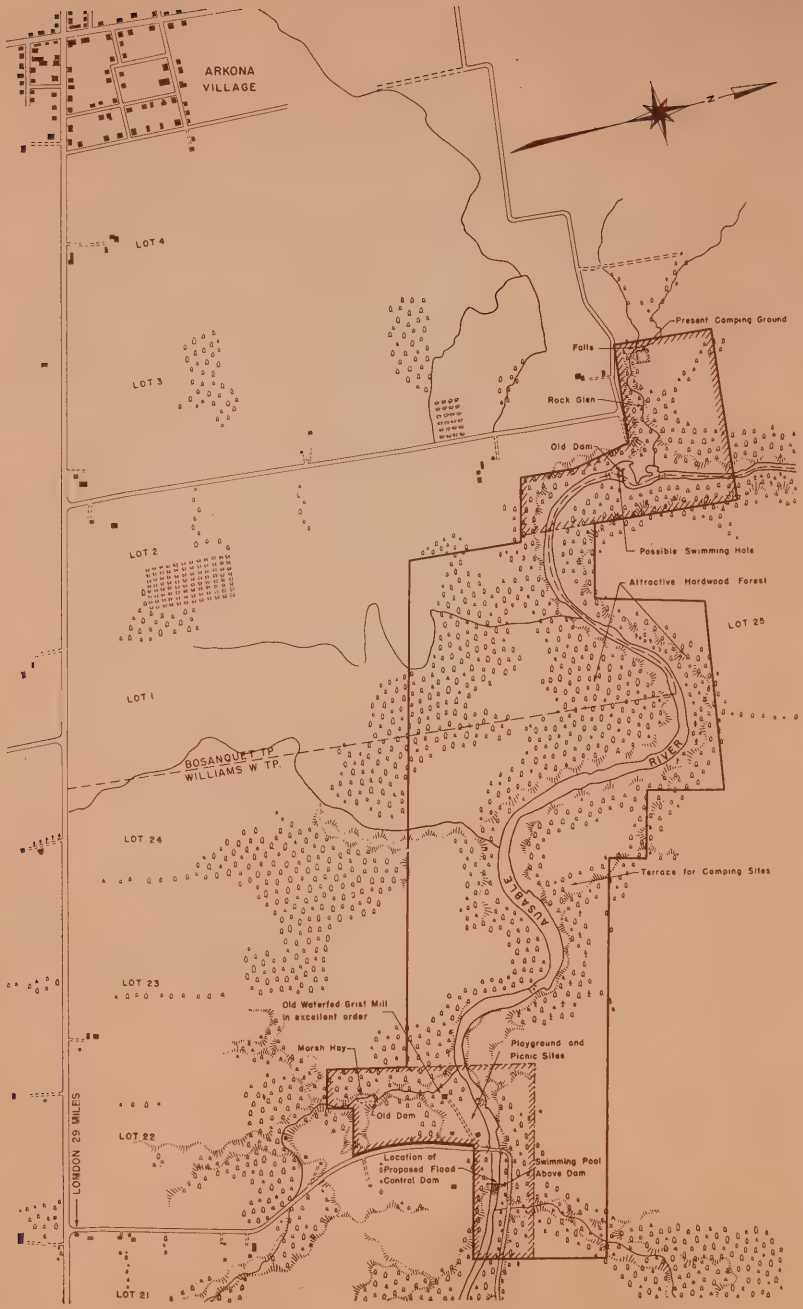
4. RECOMMENDED FACILITIES

It would hardly be practical to recommend to the Conservation Authority that it acquire and administer the whole Pinery and beach area, although this might be in the best interests of the residents of the Watershed. A more practical approach would be the acquisition of two or three small areas of suitable beach and adjoining land and the passing of a zoning by-law by the Township of

This area north of Grand Bend is typical of the kind of beach facility preferred by many year-round residents of the watershed. Shade, picnic tables, a refreshment booth, fine sand and Lake Huron; these are the requirements.

A scene in the Ausable Gorge Park, which is recommended for acquisition in this report.

The waterway of the Old Ausable in the "Pinery" is a naturalist's paradise.



PROPOSED

AUSABLE GORGE PARK

LEGEND

RECOMMENDED PARK BOUNDARY----

AREAS FOR INTENSIVE DEVELOPMENT----

WOODLAND----

SCALE: FEET

0 200 400 800 1200

Bosanquet over a much larger area in such a manner that cottage owners, store proprietors and casual visitors all would benefit. Section 406 of The Municipal Act gives the Municipality the necessary authority to carry this out.

The report includes a plan showing in detail a large part of the Pinery having 9,000 acres of non-agricultural land, in which the Township of Bosanquet could control the development. Within this zoned land three smaller areas are recommended for acquisition. One of them includes the former Ipperwash Military Camp. Another is intended as a public beach for the Port Franks area. The third includes a typical and very beautiful section of the Pinery forest.

It is recommended that 370 acres of the Ausable Gorge be acquired and administered by the Conservation Authority. This park would gradually pay for itself through profits on concessions for refreshment sales. Six smaller parks and picnic sites are recommended to be acquired for the public before the remaining trees on them are cut down. None of them is on valuable land. Several are located at old swimming holes.

Steps should be taken gradually to improve the public attitude concerning the dumping of garbage and refuse on side roads. This practice is offensive, creates a fire hazard, and the area is apt to be infested with rats. Public education is the only solution.

"River Valley Development is the wise use of all the natural resources of a river valley for all the people living in the valley, for all time."

—Samuel Woodstock

SOURCE AREAS
REFORESTATION LAND
AND
EXISTING WOODLAND

LEGEND
- EXISTING WOODLAND
- WILLOW SCRUB
- LAMBTON COUNTY FOREST

FOREST COVER TYPES

TYPE NO.	TYPE NAME
3	RED PINE
4	ASPEN
6	PAPER BIRCH
9	WHITE PINE
10	WHITE PINE-HEMLOCK
11	HEMLOCK
12	SUGAR MAPLE-BEECH-YELLOW BIRCH
13	SUGAR MAPLE-BASSWOOD
14	SUGAR MAPLE
14A	BLACK CHERRY
24	WHITE CEDAR
25	TAMARACK
26	BLACK ASH-WHITE ELM-RED MAPLE
45	BUR OAK
46	RED CEDAR
49	WHITE OAK-BLACK OAK-RED OAK
51	RED OAK-BASSWOOD-WHITE ASH
57	BEECH-SUGAR MAPLE
58	BEECH
59	ASH-HICKORY
60	SILVER MAPLE-WHITE ELM
60A	WHITE ELM
61	COTTONWOOD
88	WILLOW
P	PLANTATION

SOURCE AREAS

1.	HAY SWAMP	8.	PARKHILL
2.	HARPLEY	9.	BORNISH
3.	PINERY	10.	KEYSER
4.	SMITH LAKE	11.	AILSA CRAIG
5.	RIVER BEND	12.	CLANDEBOYE
6.	ARKONA	13.	STAFFA
7.	McINNIS		

SCALE - MILES
1 ¾ ½ ¼ 0 1 2 3

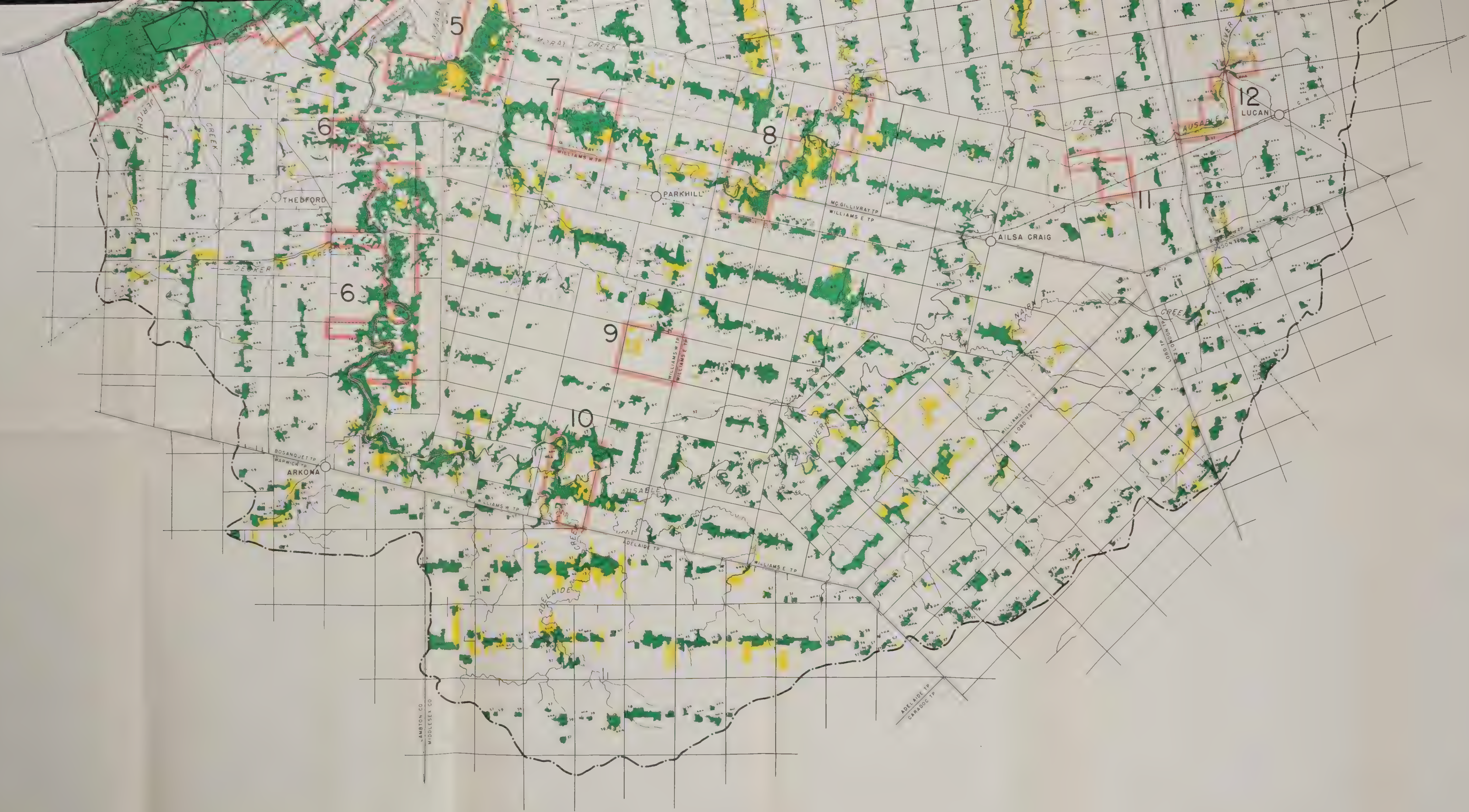
ONTARIO DEPARTMENT OF PLANNING AND DEVELOPMENT
CONSERVATION BRANCH

Source Areas
Reforestation Land
and
Existing Woodland

Ausable Watershed

No. 1 — North Section

ONTARIO DEPARTMENT OF PLANNING AND DEVELOPMENT
CONSERVATION BRANCH



5
6
7
8
9
10
11
12
THEDFORD
PARKHILL
AILSA CRAIG
LUCAN
ARKONA
MC GILLIVRAY TP
WILLIAMS E TP
WILLIAMS W TP
BOSANQUET TP
WARWICK TP
ADELAIDE TP
LAMBTON CO
MIDDLESEX CO
CARADOC TP
LOBO TP
C N R

Ontario. Planning and Development, Dept. of.
Ausable Valley conservation report,
1949. Recommendation and Summary
(Map, no. 2)

Source Areas

Reforestation Land

and

Existing Woodland

Ausable Watershed

No. 2 — South Section

ONTARIO DEPARTMENT OF PLANNING AND DEVELOPMENT

CONSERVATION BRANCH

AUSABLE WATERSHED

LAND USE SURVEY

SOILS

LAND FORMS

BEACH	B
LAKE SAND PLAIN	S
KAME MORAINE	K
LAKE CLAY PLAIN	C
CLAY VENEER TILL	V
SILT VENEER TILL	L
LAKE SILT PLAIN	C'
PEAT	P
MUCK	m
SILT	S'
TILL PLAIN	T
CLAY MORAINE	TM
BOTTOM LAND	BL
SPILLWAY	W
SAND BLOW HOLES	u
BOULDER BEACH	

LAND CONDITIONS

DRAINAGE

Imperfectly drained	d
Poorly drained	p

SLOPES

2-5 percent	A
5-15 percent	B
over 15 percent	E

HUMMOCKY SLOPES

5-15 percent	N
over 15 percent	R

EROSION

Into topsoil	1
Into subsoil	3
Into parent material	5

SCALE = MILES

ONTARIO DEPARTMENT OF PLANNING AND DEVELOPMENT
CONSERVATION BRANCH

LAKE HURON

GRAND BEND
PORT FRANKS
KHIVA
SHIPKA
GREGITON
EXETER
CENTRALIA
PARKHILL
THEODORE
ARKONA
ZURICH
HENSALL
STAFFA
CROMARTY
FARQUHAR
CLANDEBOYE
LUCAN
DENFIELD
FALKIRK
NAIRN
FAILS CRAIG
DASHWOOD
STEPHEN TWP
HAY TWP
STANLEY TWP
USBORNE TWP
MCGILLIVRAY TWP
WILLIAMS
ADELAIDE TWP
ROSANQUET TWP
WARWICK TWP
LAMBTON CO.
MIDDLESEX CO.

AUSABLE WATERSHED

LAND USE SURVEY

SOILS

ONTARIO DEPARTMENT OF PLANNING AND DEVELOPMENT
CONSERVATION BRANCH

AUSABLE WATERSHED

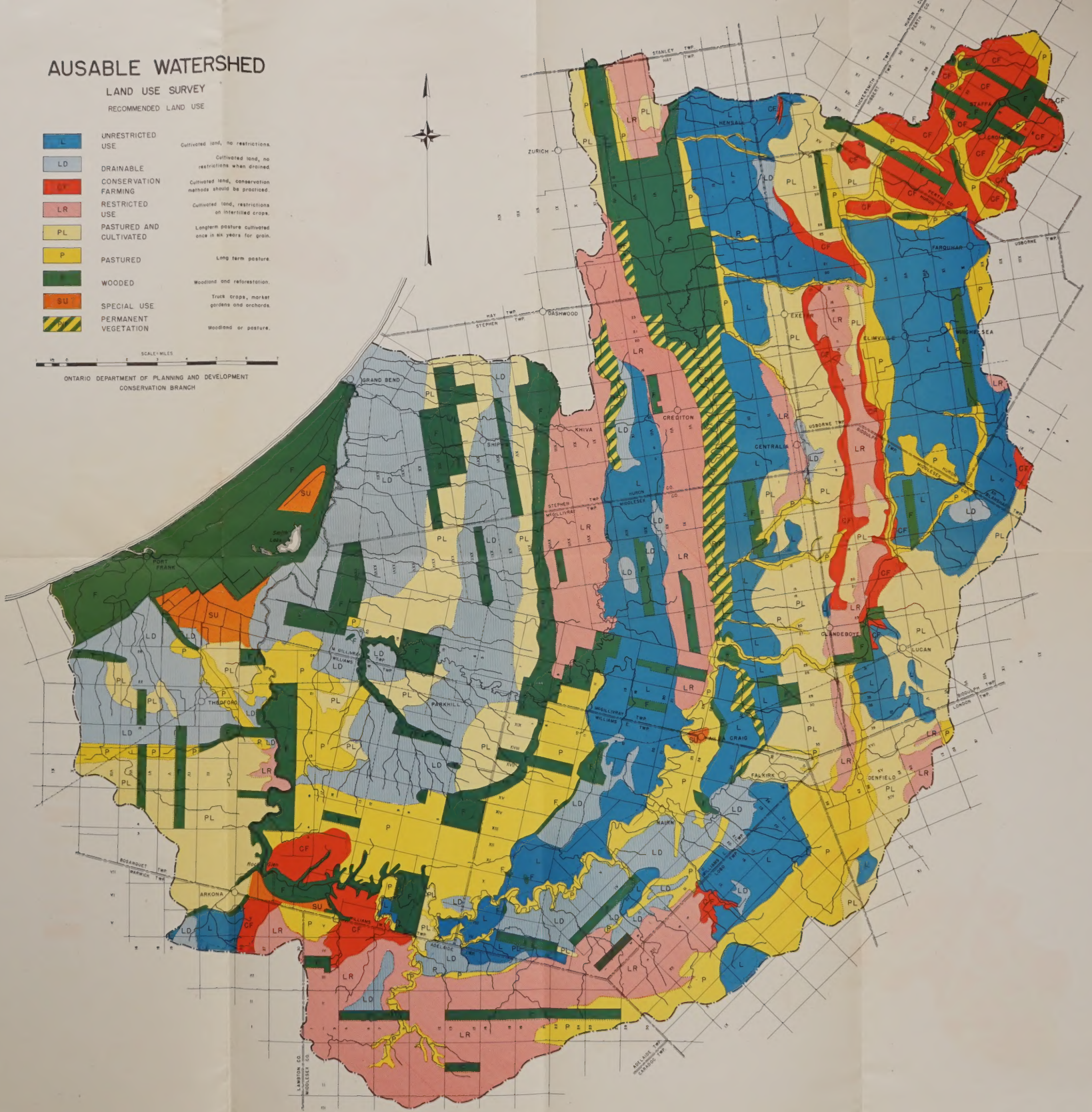
LAND USE SURVEY

RECOMMENDED LAND USE

L	UNRESTRICTED USE	Cultivated land, no restrictions.
LD	DRAINABLE	Cultivated land, no restrictions when drained.
CF	CONSERVATION FARMING	Cultivated land, conservation methods should be practiced.
LR	RESTRICTED USE	Cultivated land, restrictions on intertilled crops.
PL	PASTURED AND CULTIVATED	Longterm pasture cultivated once in six years for grain.
P	PASTURED	Long term pasture.
F	WOODED	Woodland and reforestation.
SU	SPECIAL USE	Truck crops, market gardens and orchards.
F/P	PERMANENT VEGETATION	Woodland or pasture.

SCALE - MILES

ONTARIO DEPARTMENT OF PLANNING AND DEVELOPMENT
CONSERVATION BRANCH



Ontario. Planning and Development, Dept. of

Ausable Valley Conservation Report, 1949. Recommendation and Summary (map no 4)

AUSABLE WATERSHED

LAND USE SURVEY

RECOMMENDED LAND USE

ONTARIO DEPARTMENT OF PLANNING AND DELEVOPMENT

CONSERVATION BRANCH